The Electrical Industry's Weekly Magazine November 14, 1960

Electrical World

Price 50 Cents

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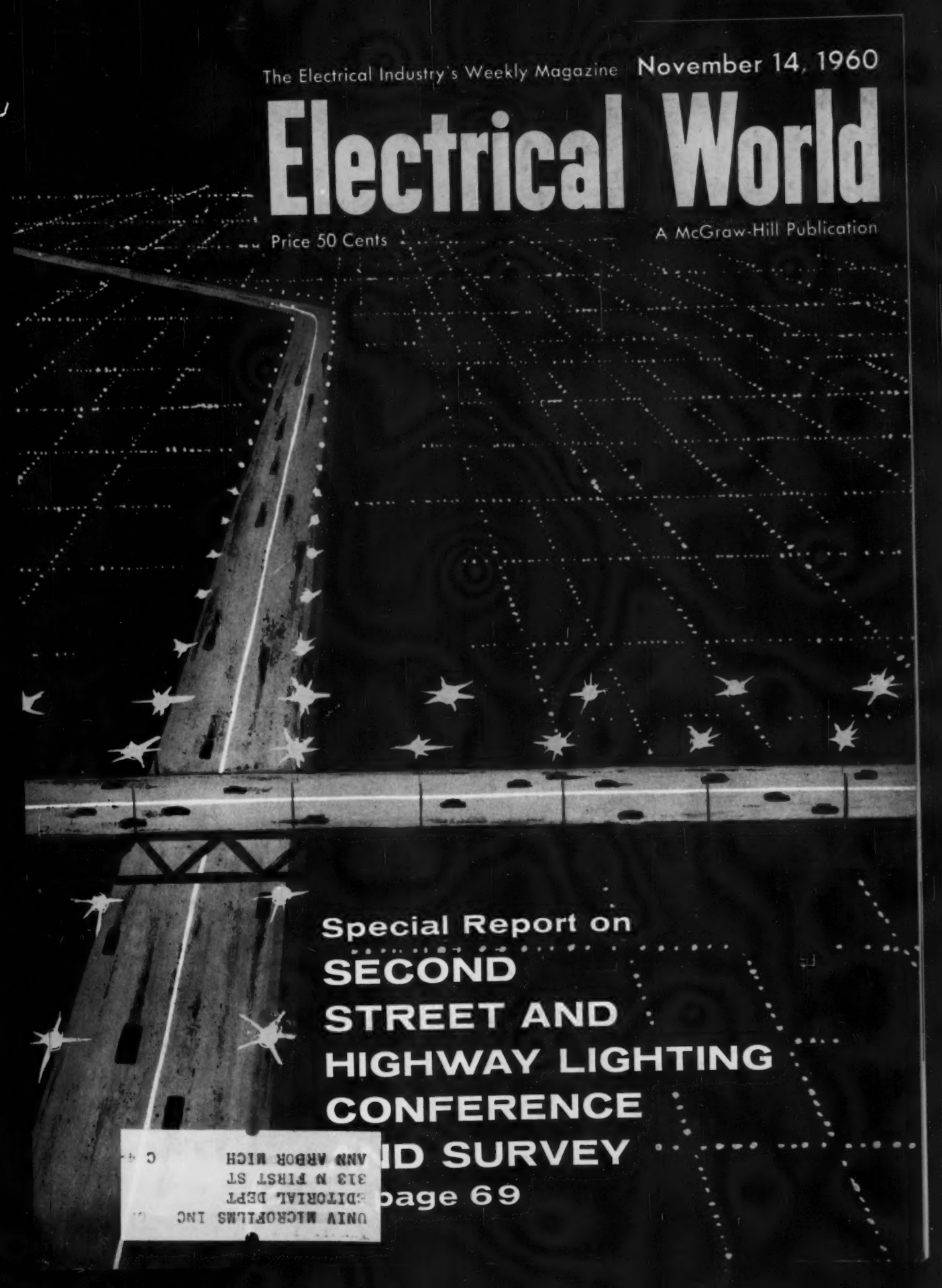

Special Report on

SECOND STREET AND HIGHWAY LIGHTING CONFERENCE

ID SURVEY

page 69

UNIV MICROFILMS INC
EDITORIAL DEPT
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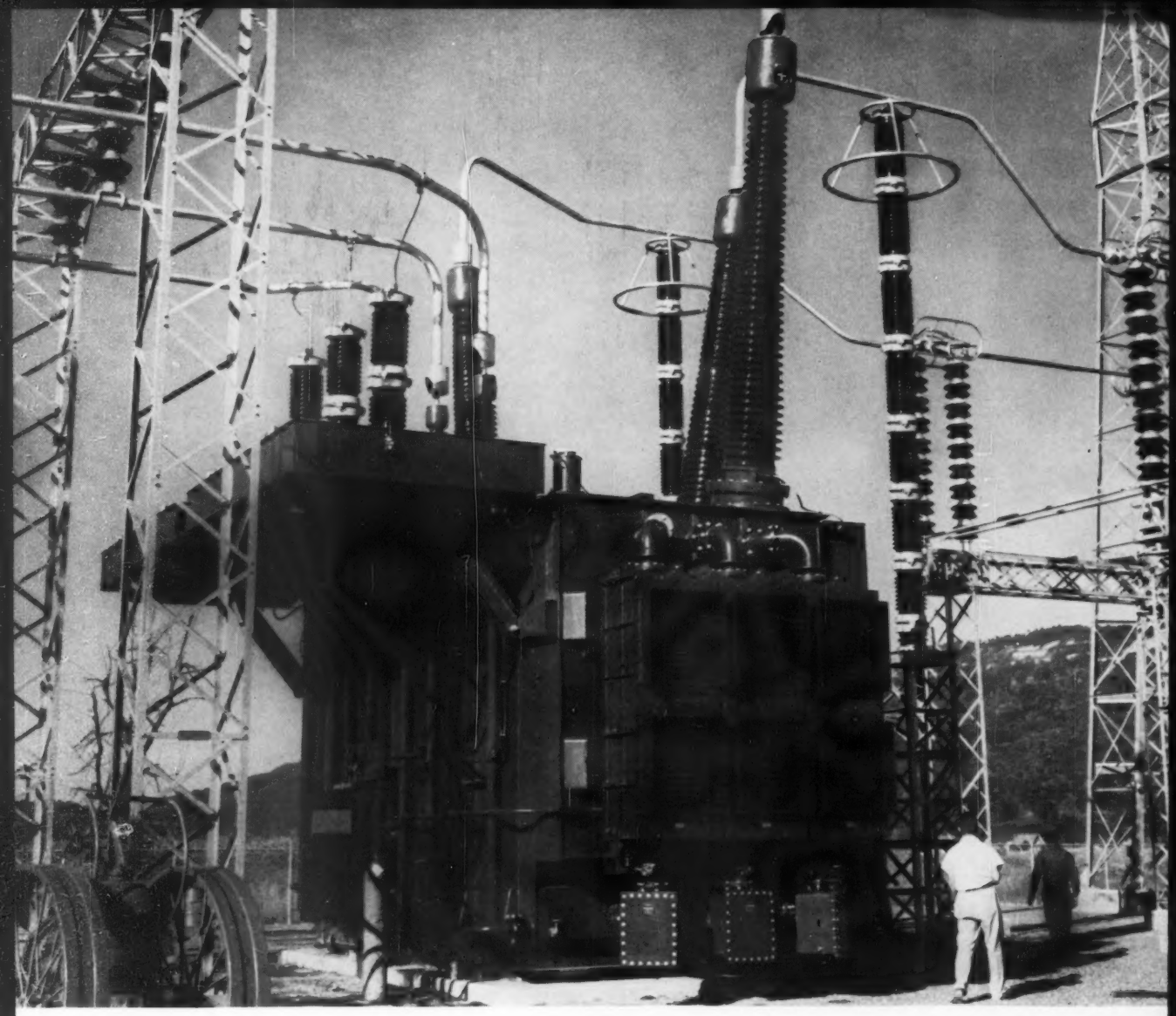


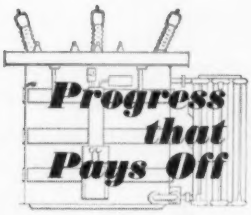
FIRST OF ITS KIND—
YET OF NORMAL DESIGN

This EHV unit, at the Claysburg Station of Pennsylvania Electric Company, is the highest-voltage three-phase power transformer in utility service in America. First of its kind, it is rated at 460/115 kv, 60,000 kva output, designed and tested at 1425 kv BIL.

Design and appearance are like that of other General Electric power transformers. This unit conforms to current utility preference for low-cost, three-phase construction. It essentially extends G-E's line of PD power transformers of customer-preferred design.

When you are ready to go to EHV, you can count on the economy and reliability of General Electric power transformers.

421-61



POWER TRANSFORMER DEPARTMENT

GENERAL ELECTRIC

PITTSFIELD, MASS.

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Electrical World

NOVEMBER 14, 1960

Vol. 154, No. 20

Electrical What in the World . . .

"Ever think what it would be like to be an *Electrical World* engineering editor?"

This was the lead in an ad we ran in our own book on Aug. 8. Our specs for the post included "at least several" years with a utility, manufacturer, or consultant. Concluded the ad, "The man we want should be capable of 'catching fire,' and of maintaining a high degree of enthusiasm. Anyone who thinks he approximates . . ."

The item pulled 18 replies, many top-grade people. Among them was a tall, intense fellow who came in to look us over. He met the specs and then some: Ten years with Cleveland Electric Illuminating on design, construction and operation of power plants, substations and lines, and as a senior system planning engineer; a year's plant design and construction with Ebasco International in Brazil; now with GE's Electric Utility Engineering group on system studies.

Why did Bruno Zambotti think he wanted to write engineering instead of doing it? A familiar ring: Wanted to broaden his scope of knowledge about the utility game.

We checked: He could write. We wanted him. But it took Bruno some soul-searching to make sure this abrupt change in his career line was right. It's a wrenching decision which many an EW engineer once made.

This week Bruno Zambotti was piped aboard. Standing with veteran Senior Editors Dan Braymer and Len Olmsted and a host of crackerjack field and office editors, he'll help ensure the coverage in engineering depth you expect of us.

Chuck Hochgesang

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and we keep 'em uniform!

Sometimes you have to build new tools to do the job right. Like this automatic trimming machine. We designed it and built it, here at Lapp, because there just wasn't any other way as good to produce insulator shells precisely right in size and shape.

We're just as finicky about every phase of insulator production, from clay slurry to final flashover testing. We keep 'em uniform. And as we develop new improvements, you get the benefit of them in *every* insulator that leaves our plant.

You can read the results in operating records. Less maintenance . . . lower replacement costs . . . fewer interruptions of service. Because the uniformity of Lapp suspension insulators keeps performance to your specifications. Something to bear in mind next time you order.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

Letters

They Didn't Happen Here!

To the Editor:

Please correct the statement attributed to me in the October 17 issue of *Electrical World*. In the article, "Power Plant Automation Fully Justified," the last sentence of the third paragraph reads, "Hess said that the cost of such accidents has been $600,000 each for the last ten which occurred on the Louisiana P&L system."

I do not remember my exact words because the statement was made in response to questions from the floor, but the idea I was intending to convey was that the *last ten such accidents of which I had a record had cost an average of* $600,000 *each.*

None of these accidents occurred on the system of Louisiana Power & Light Company.

The realization that the probability of such accidents is the same for our company as for others was the major factor in awakening our interest in computer control for generating stations.

W. T. Hess, Vice President & Chief Engineer
Louisiana Power & Light Co
New Orleans, La.

▶Our apologies to reader Hess whose early recognition of the high cost of accidents prompted the decision to apply computer control to the Little Gypsy power plant.

Energy Output—Not Power Output

To the Editor:

For many years you have been publishing a chart showing "Weekly Power Output" for the US. Obviously your editors do not read your technical publications.

Please refer to Standard Handbook for Electrical Engineers, 9th Edition, Section 3, paragraphs 155 and 156. A careful reading of this reference will show that what you are actually reporting so accurately each week is energy output—not power output. Kwhrs are units of energy, not power.

How about tagging this data with its correct name in the future?

Lewis B. Walker
Gonzales, Texas

▶Old habits die slowly. Give us a few weeks to consider your suggestion.

Dateline . . .

Washington, D. C.—When Washington Public Power Supply System filed its "11th hour" application with the Federal Power Commission last March to build Nez Perce dam—conflicting with Pacific Northwest Power's long-standing application for the High Mountain Sheep project—the Nez Perce applicants didn't even have plans or a cost estimate for fish facilities in their application. There were other questions as to Nez Perce's exact site, power markets and financing. The odds were strongly in favor of High Mountain Sheep.

Today, the "trend"—as political forecasters say—would seem to be running away from High Mountain Sheep.

It's not that Nez Perce is the "better" project. The FPC staff, conversely, has found High Mountain Sheep to have a higher benefit-cost ratio; and finds the ultimate development of the Snake and Salmon Rivers to be better with the High Mountain Sheep series of projects than with the Nez Perce series, and there also remain a number of questions to be asked of WPPSS as to its financing and power markets, not to mention the migratory fish problems at the huge Nez Perce dam site. There is also a legal question of whether the public power group, organized in Washington, has the right to build a dam in Oregon and Idaho without the specific permission of those states.

This "trend" away from High Mountain Sheep isn't based on a popularity contest, either. Unlike the earlier publicity between rival public and private Hells Canyon applicants, the Nez Perce-High Mountain Sheep conflict is scarcely political or headline material. If anything, the majority of intervenors in the present case prefer High Mountain Sheep—or object more strenuously to Nez Perce.

This "trend" (if the proper word) is based on the number of obstacles that are being thrown in the

(*Continued on page* 59)

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CHANCE Clamps for Big Conductor

WIDE RANGE

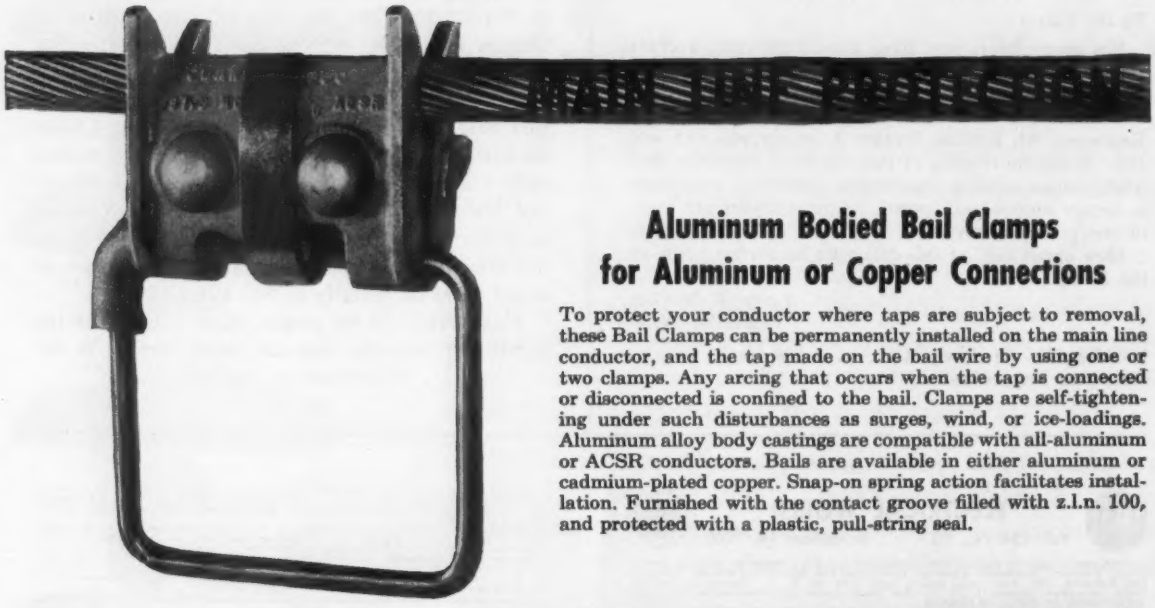
All Aluminum for Highly Corrosive Areas

Built for Heavy Duty

These All-Aluminum hot line clamps combine several advantages for heavy duty line construction. Their bulk gives them both the mechanical strength to withstand extreme tightening torque without distortion, and the ability to carry excessive current without heating.

The fact that all exposed surfaces are aluminum makes them the clamps to use in corrosive areas where other clamps might fail. Their conductor range for both main line (No. 2 to 397.5 MCM ACSR) and jumper (No. 4 Solid AWG to 397.5 MCM ACSR) makes them versatile clamps for many applications.

Important from the conductivity standpoint are the wide jaws with special "waved" contact surface, and the heavy terminal pad. To further insure good conductivity, these clamps are available individually packaged in polyethylene bags with Chance z.l.n. 100 Electrical Contact Aid pre-applied to contact surfaces. Price per clamp in lots of 100, $2.65. AGP (fortified cadmium plated) packaged clamps are also available, at $2.90.



Aluminum Bodied Bail Clamps for Aluminum or Copper Connections

To protect your conductor where taps are subject to removal, these Bail Clamps can be permanently installed on the main line conductor, and the tap made on the bail wire by using one or two clamps. Any arcing that occurs when the tap is connected or disconnected is confined to the bail. Clamps are self-tightening under such disturbances as surges, wind, or ice-loadings. Aluminum alloy body castings are compatible with all-aluminum or ACSR conductors. Bails are available in either aluminum or cadmium-plated copper. Snap-on spring action facilitates installation. Furnished with the contact groove filled with z.l.n. 100, and protected with a plastic, pull-string seal.

A. B. CHANCE COMPANY

CENTRALIA, MISSOURI

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CC60-22

You can save money with this booklet

As another Graybar special service to Utilities, we again offer a fully illustrated handbook filled with information and suggestions on the best way to use and preserve basic hand tools.

For your sample copy of LONG LIFE TO TOOLS, ask your Graybar salesman, or write us directly: our guess . . . once you've read LONG LIFE TO TOOLS, you may feel it's well worth passing along to everyone concerned . . . engineers, superintendents and even your line crews. Just let us know how many additional free copies we can send you for distribution. We'll supply them promptly.

Graybar, a working "partner" of utilities for years, knows utility tools and tool problems. But, whatever the problem, whether a special order, special product information, regular scheduling or emergency shipments of materials, equipment and tools, Graybar is geared to provide the Utilities with *special* assistance.

978

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You save on storeroom costs
Reduce inventory investment
Insure prompt delivery
Step up manhour efficiency
Simplify bookkeeping

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Everything Electrical GraybaR ELECTRIC COMPANY

ELECTRIC COMPANY, INC.
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IN OVER 130 PRINCIPAL CITIES

LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING

Do these fit you?

The new O-B stacking Unipost is interchangeable in its stacking position - - the identical unit goes in the top, intermediate, or bottom position. No more single-purpose stacking units. No more confusion in the warehouse or on the construction site. No more needless, triple inventory.

This applies to *all* Unipost combinations. But, some offer a still further advantage. Certain Unipost units act as components for two or three different BIL ratings, depending only on the number of identical units used. If this is the case, just one Unipost catalog number in your stock will build or maintain two or perhaps three different BIL-rated stacks. The chart here tells the story. Study it carefully. It may offer a lot of saving - - in money as well as trouble.

O-B has modernized the stacking insulator with its new Unipost - - simplified its application - - reduced its inventory cost - - improved basic post design.

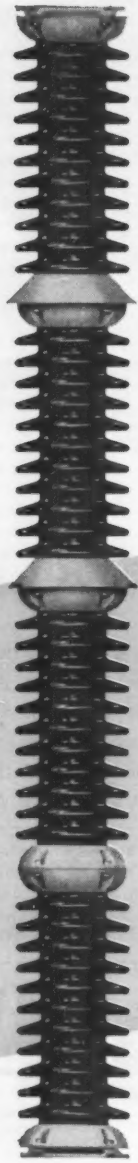
When you specify new switchgear, or when you plan new stations, be sure to include the new O-B stacking Unipost.

OHIO BRASS COMPANY • MANSFIELD, OHIO

Ohio Brass

HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES



If your station insulation fits any of these popular patterns, your cost of stacking post insulator inventory can go 'way down!

Unipost unit catalog numbers, and the complete stacks each unit will build. The same unit fits all stacking positions. There are additional Unipost units and stack combinations. For the complete series, see new O-B Switch and Bus Insulator Catalog No. 32, or O-B Publication No. 1459-H.

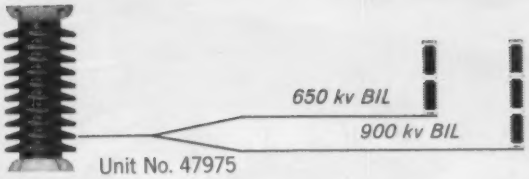
10010-H

STANDARD STRENGTH

HIGH STRENGTH

EXTRA HIGH STRENGTH

Normal Range of Application
Operating Voltage kv



Unit No. 47975

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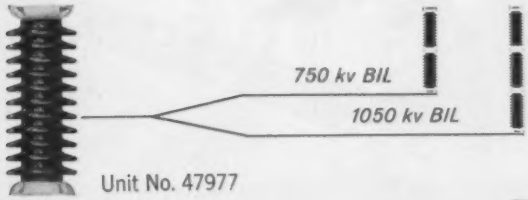
195 • 230 • 287



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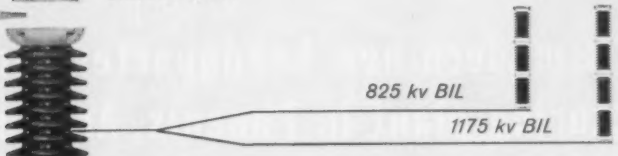

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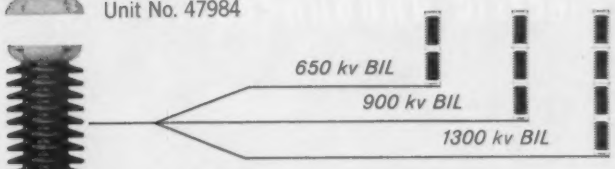

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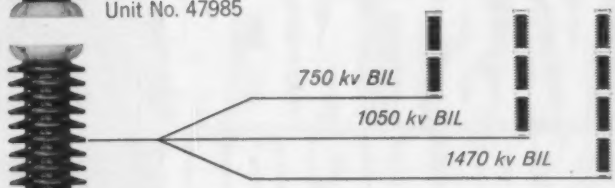

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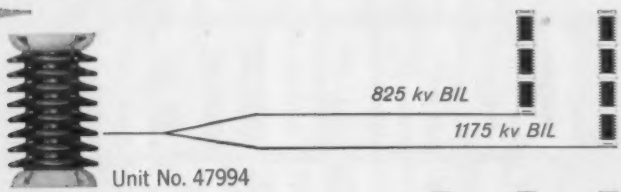

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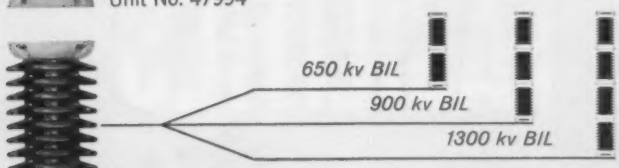

Unit No. 47995

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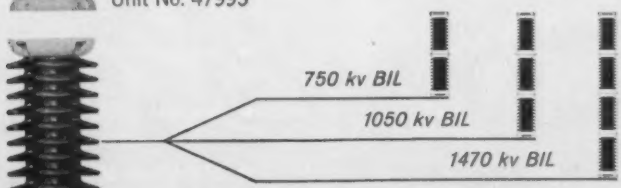

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From this modern new headquarters and manufacturing plant in Phoenix, Arizona General Electric *Announces...*

A VAST NEW EXPANSION IN COMPUTER FACILITIES

★ New Information Processing Center

■ New Sales Office

● Existing Sales Office

GENERAL ELECTRIC COMPUTER DEPARTMENT ADDING

11 NEW INFORMATION PROCESSING CENTERS AND 10 NEW SALES OFFICES TO THE 16 SALES OFFICES NOW OPEN!

To better serve your computer needs, eleven new Information Processing Centers will be opened within the next year-and-one-half in addition to the two Information Processing Centers now operating in Arizona. Site surveys are proceeding in seven other key cities for additional processing centers. Ten new computer sales offices will be added to sixteen now open (General Electric presently operates offices in 350 key cities throughout the U.S.).

These vast expansions of facilities, manpower and actual operating computer systems are the direct result of customer confidence in the General Electric Company Computer Department and the great expansion of the computer industry as a whole.

General Electric's competence in the computer field is the product of 40 years' experience. General Electric provides computing and information processing systems for business, industry, science, engineering, education and defense.

If you are considering the application of a computer to your firm's operation, contact the existing Computer Department sales office nearest you or write directly to:

General Electric Company • Computer Dept. • 13436 North Black Canyon Highway • Phoenix, Arizona...today!

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General Electric—Pioneer in computer systems for all phases of business, industrial, scientific, engineering and financial endeavor.

Nation's first MICR* Information Processing Center . . . with GE 210 computer system.

General Electric computers on test in modern manufacturing facilities.

GE-312 control computer now operating in various industrial applications.

*Magnetic Ink Character Recognition

Progress Is Our Most Important Product

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CPA36 (10-60)

MONOTUBE POLES
in steel or aluminum

. . . engineering and styling to meet today's rigid outdoor lighting requirements

Business District Lighting

Highway Lighting

Residential Lighting

Area Lighting

UNION METAL

THE UNION METAL MANUFACTURING COMPANY

Canton 5, Ohio Brampton, Ontario

Monotube Engineered Lighting Poles

Now from Kuhlman—

12% uprating OF ALL "POLE-TYPE" TRANSFORMERS

Featuring longer-life SPI-65* insulation with 65° rise

The new '60 dual-rated transformer includes an "ALL NEW" core and coil with better voltage regulation, more revenue per transformer, smaller, lighter, more efficient design.

Kuhlman transformers, known through the years for their high overload capacity, are now being uprated 12%. This means all "pole-type" ratings and medium power transformers through 10,000 KVA will have dual name plate ratings. For example, a transformer formerly rated 25 KVA provides 25 KVA performance at 55° temperature rise and 28 KVA performance at a 65° rise with no sacrifice in transformer life.

This uprating, which has been a performance fact for some time, is possible because of the excellent temperature rise characteristics inherent in all Kuhlman transformers. Now, longer-life SPI-65* insulation has also been added. The combination of inherent low temperature rise and SPI-65* provides both uprating and longer life to suit the loading practices that best meet your needs.

No longer is it necessary to choose between inherent thermal characteristics and super insulation. Kuhlman now offers both in one design. Ask your Kuhlman representative to show you why now, more than ever, your transformer dollar goes farther with Kuhlman.

*Licensed under Westinghouse Insuldur® patent rights.

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Mich.

Manufacturers of transformers since 1894

FACTORIES: Bay City, Mich. • Crystal Springs, Miss. • Salinas, Calif.

Thousands of F-P Controlled Lights Keep Duke Power's Area Bright as Carolina in the Morning

Nothing could be finer for back yards, barnyards, and business property — than adequate, automatically controlled lighting. That's the reason why increasing numbers of Carolinians are taking advantage of Duke Power Company's low-cost unmetered lighting service.

Fisher-Pierce Series 6600A Controls operate thousands of incandescent and mercury vapor lighting units that are provided for a flat charge of $3.00 per month — a rate made possible by connecting the lamps into existing 120-volt lines. Installation, power and maintenance are also included in this rate, but the use of reliable F-P controls helps to reduce maintenance to little more than replacement of burned out lamps.

Photoelectrically controlled all-night lighting is an excellent off-peak load builder for the utility. And for their customers, all-night lighting gives them economical protection from burglary and vandalism — as well as the reassurance of coming home at night to well-lighted surroundings. Regardless of season, time of day or the weather, Fisher-Pierce controls dependably turn lights on whenever they are needed.

AS SURELY AS DARKNESS FALLS, the lights will turn on. Fisher-Pierce tubeless photoelectric controls provide dependable, completely automatic operation of lights for streets, homes, farms, and business property.

MORE THAN ONE MILLION KW will be the capacity of Duke Power Company's Allen Plant. Already completed are four of the five units in what will eventually be the largest steam-electric power generating station in the South Atlantic states.

TOWARD NUCLEAR POWER — Duke Power Co. and three other major electric companies serving the Carolinas and Virginia have joined in planning and construction of a 17,500 KW nuclear power plant, scheduled for operation in 1962.

For complete design information and operating specifications on Series 6600A controls, write The Fisher-Pierce Co., 82 Pearl Street, So. Braintree 85, Massachusetts.

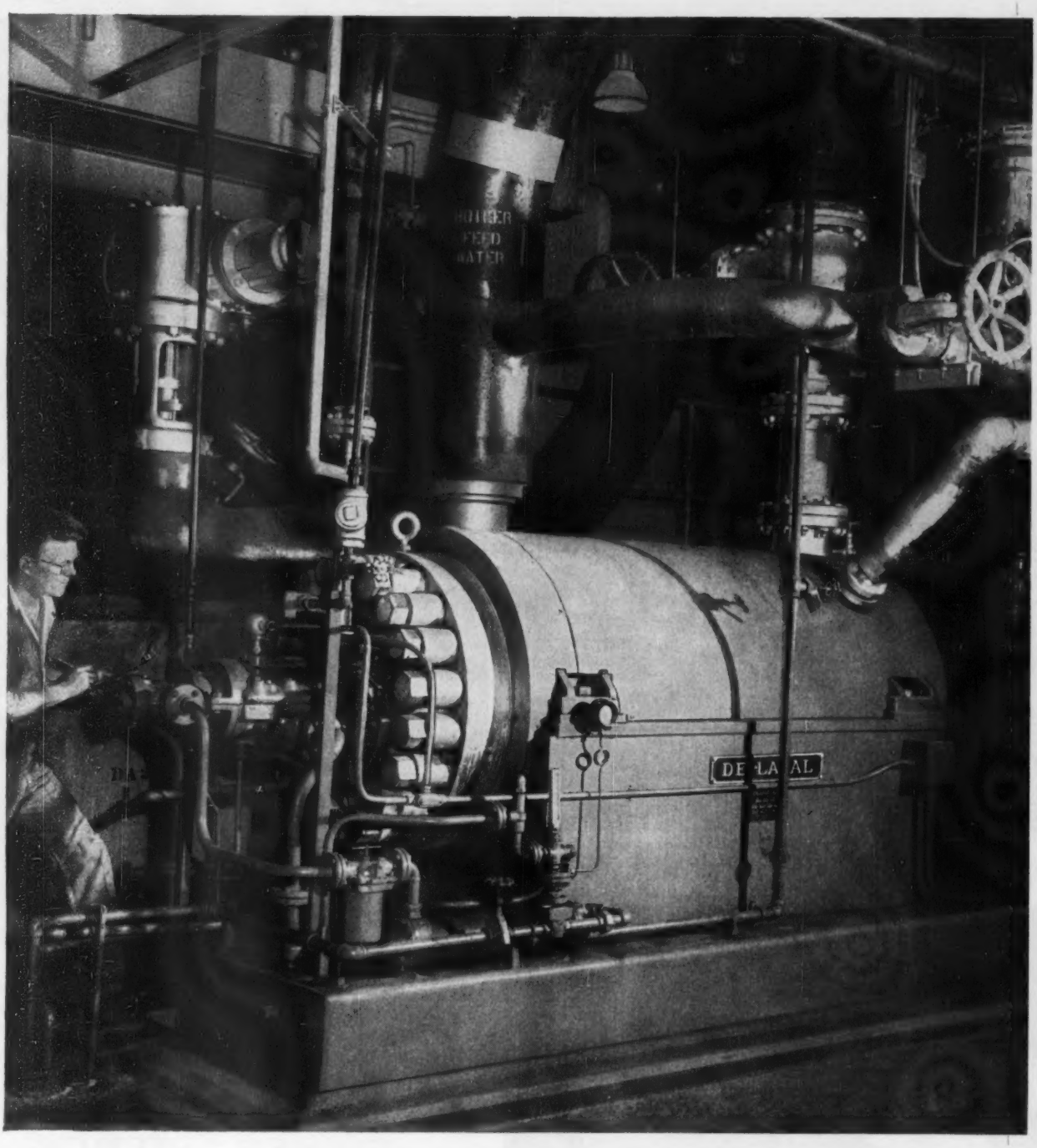
FP

FISHER PIERCE

Electrical and Electronic Equipment for Industry, Utilities and the Home

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

DE LAVAL Feed Pumps serve



latest unit at Central Hudson

Burns and Roe Inc., Engineers and Constructors, complete third unit at Danskammer Station

To meet increased load demand, Central Hudson Gas & Electric Corporation has added a 140,000 KW 2400 psig main unit at its modern Danskammer Steam Station. Providing dependable boiler feed service are two 2500 HP direct motor driven half capacity De Laval barrel type boiler feed pumps. The earlier units have De Laval full capacity variable speed boiler feed pumps.

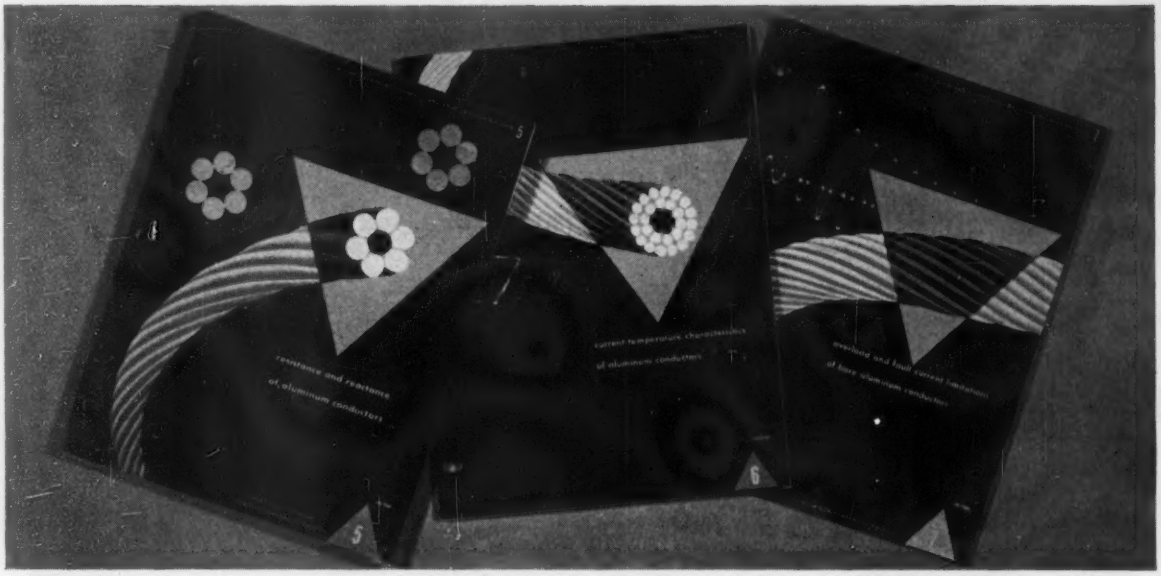
← Each De Laval pump has intermediate pressure bleed off for use in controlling steam temperature from reheater.

Central Hudson's modern Danskammer Steam Station located at Roseton, New York on the Hudson River.

DE LAVAL STEAM TURBINE COMPANY
861 NOTTINGHAM WAY, TRENTON 2, N. J.

DL-216

for the latest data on ACSR



126 fact-filled pages...from Alcoa

It took more than 60 years to prepare these three publications.

Recently completed tests have made it possible to review and revise data accumulated since 1897, the year Alcoa launched a continuous research program on overhead aluminum conductors— *both all-aluminum and ACSR*. The most up-to-date information has been put into book form to help you in your job:

Design or operation of transmission lines is your problem. Maybe you're called on to predict the resistance and reactance of a proposed transmission line. Are available data good enough? This 90-page book supplies you with new information on resistance and reactance—information that can help you accurately evaluate the effects of the steel core on electrical characteristics. TITLE: *Resistance and reactance of aluminum conductors.*

How much heat loss can you expect from convection? Tough problem. One that's complicated by the chimney effect of a heated conductor. And varying wind conditions. This 20-page publication provides up-to-date information on heat dissipation caused by convection and radiation. TITLE: *Current-temperature characteristics of aluminum conductors.*

Electrical requirements on your system go up. You need to operate conductors at higher temperatures than in the past. You ask yourself: what about creep effect? Here's a 16-page booklet that provides easy-to-use answers to many questions on how aluminum conductors behave when subjected to various conditions of heating by high overload currents. TITLE: *Overload and fault current limitations of bare aluminum conductors.*

Ask any one of our representatives for your copy of these new publications. Written requests on company stationery should be mailed to Rome Cable Division of Alcoa, Dept. 1-110, Rome, New York.

ROME CABLE
DIVISION OF **ALCOA**

Up high at low cost in safety

the new **PITMAN PELICAN**™

Now your crewmen can work aloft in mechanical and electrical safety. No more bobbing ladders or dangerous, swaying crowsnests – the operator simply steps into the Pelican's fiberglass bucket, presses the easy-to-use control levers, and sweeps aloft in seconds!

The rigid fiberglass boom holds him steady with no "creep," even if hydraulic lines were to be damaged. He can change position instantly, with all the precision of a high-priced machine.

There's no longer any need to "ground" highly-skilled men when their climbing days are past. The Pitman Pelican puts them back to work – at jobs up to 40 feet high – faster and more safely than with old-style ladders or irons . . . and at far less cost than other aerial devices on the market.

Yes, the Pitman Pelican costs even less – in initial investment and maintenance – than old-fashioned powered aerial ladders. Available in 28′, 32′ and 36′ sizes; can be mounted (depending on size) on most ¾ to 1½ ton trucks. Turn this page for more details . . .

for the cost of a powered ladder,

you can put your men aloft in this

PITMAN PELICAN™

the lowest-cost all-hydraulic fiberglass aerial bucket

Lightweight fiberglass bucket levels itself hydraulically, has 300 lb. capacity. Unit is designed for use without outriggers, although spring lock-outs or torsion bars are optional, if desired. Boom revolves 360° in either direction, elevates to 75° above horizontal, extends to full reach in seconds. Entire telescoping section is fiberglass.

The Pitman Pelican is ideal for work on electrical distribution lines, street light maintenance, tree trimming and other high work. Note convenient controls on rear lip of fiberglass bucket; dual controls on truck also rotate, extend and raise boom simultaneously.

Pelican's compact design permits installation on most popular-sized utility line trucks; for example, a 28′ Pelican mounts on most ¾ ton trucks. Note wide passage on either side of pedestal, making truck deck accessible.

Pelican trims for travel in moments. Operator simply retracts boom, rotates it into forward carrying position, and tips it (hydraulically) up into the yoke. Overhead clearance is less than ten feet when stowed for travel.

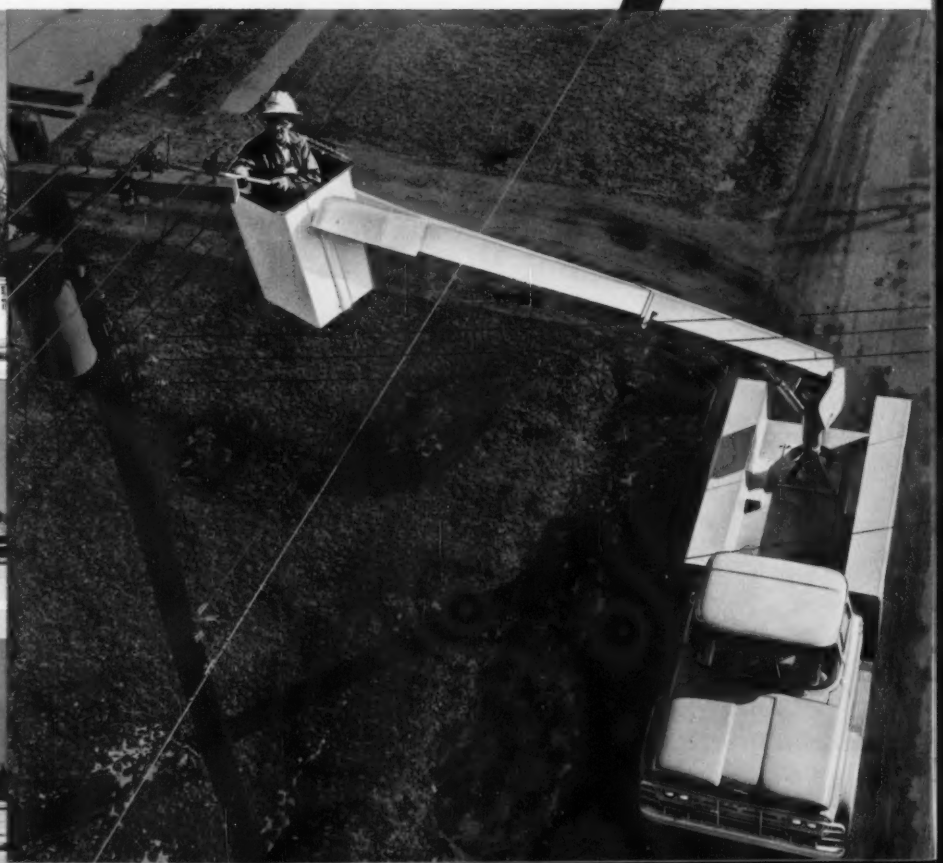
Your nearest Pitman Distributor will be happy to demonstrate this low-cost, high-reaching aerial bucket—a card or a call will do. Or, simply contact . . .

PITMAN MANUFACTURING CO.

12811 Pitman Road • Grandview, Missouri

Telephone: SOuth 1-1851

PITMAN MANUFACTURING (CANADA) LTD., TORONTO



Electrical World

NOVEMBER 14, 1960
Vol. 154, No. 20

Preview of the Issue

DEPARTMENTS

Editorial Comment..... 53
What in the World..... 3
Letters 5
Dateline 5
Electrical Week..... 22
Supply Lines 23
News Scope 59
Reference Sheet 66
EUM 68
Manufacturers News 85
New Equipment 93
Management Newsletter..101
News About People.....110
Advertising Index 124

● **NEEDED: Steam electric generating units better adapted for system load cycling. Problems in dispatching peak and light loads show need for units with wide load range and low average annual heat rate**..... 60

● **REVERSIBLE HYDRO SCHEME on France's River Rance replaces plan for nuclear plant in Brittany. Under construction, the scheme will generate power using both tide and river flow**..... 62

● **OPTIMISTIC: That was the tone of EW's Second Street and Highway Lighting Conference. Many common problems are still present, but utilities and manufacturers are attacking them with new vigor. Survey also shows pick-up in interest** 69

CURRENT EVENTS

APPALACHIAN POWER CO IS ABSENT from FPC hearing on company's alleged accounting violations. Company protested hearing and requested delay, but hearing went on anyway and recorded FPC staff testimony against APCo..... 55

OPERATING LICENSE is expected for Con Edison's Indian Point nuclear plant . . . Westinghouse has gotten 'turnkey' agreement from Texas Electric Service..... 54

YOUTH CONFERENCE ON ATOM: Twenty leading scientists and businessmen, answering the questions of 250 students, show relationship between basic sciences..... 58

DATELINE

TREND IS AWAY FROM HIGH MOUNTAIN SHEEP as obstacles block path of its application with the Federal Power Commission..... 5

ELECTRIC UTILITY METHODS

GEAR RECONDITIONING METHOD proves economical, time-saving . . . Job-fabricated reeling device simplifies rope-coiling..... 68

ENGINEERING REFERENCE SHEET

SIMULTANEOUS OPEN-DELTA DUPLEX TRANSFORMER loading is determined using curves from net current flow in each transformer from single and 3-phase loads..... 66

FOREIGN

ATOMIC POWER CAPACITY OF 8,000 Mw by 1966 is foreseen at Vienna conference..... 65

BIGGER EDITION OF TVA in Mexico, if approved, will have 2.4-million-kw capacity to spur development of large depressed south-central Mexico area..... 109

MANAGEMENT

WHY A COMPANY PUBLICATION? Although there is no return on investments in this $135-million business, publications with a purpose—that of selling the employees on their company—are regarded as highly effective..... 101

BUYING: Utility and coal men study new freight hike . . . Second manufacturer raises insulator prices in Western states . . . Backlogs mixed on heavy equipment..... 23

MANUFACTURERS NEWS

SHARP DECREASE in orders from domestic users of heavy electrical equipment is noted in EEI third-quarter survey . . . HV motor control has compact two-unit design..... 85

POLITICAL

POLITICS AND POWER: How the Congressional elections affected controversial figures in the public-vs-private power tug-o'-war..... 56

LATE NEWS ▶ **It appears that nobody really wants to own Colombiana de Electricidad,** an American & Foreign Power Co electric utility in Colombia. A report of completed negotiations for its sale to the Colombian government is emphatically denied by A&FP officials. In the background there is some similarity to the recent A&FP situation in Mexico. A&FP needed more revenues in Colombia; asked for a 72% increase; was granted 35%; industries successfully objected, and A&FP decided to sell. Because an expansion is urgently needed, the Colombian government does not want to buy the utility—and the industrialists who screamed about rate increases do not want the government to buy it because it could not afford the expansion. The word from *Electrical World's* reporter in Bogota is that negotiations may not take place, and that government confiscation is out of the question. A&FP needs to get $27.5 million for the property (see News Scope).

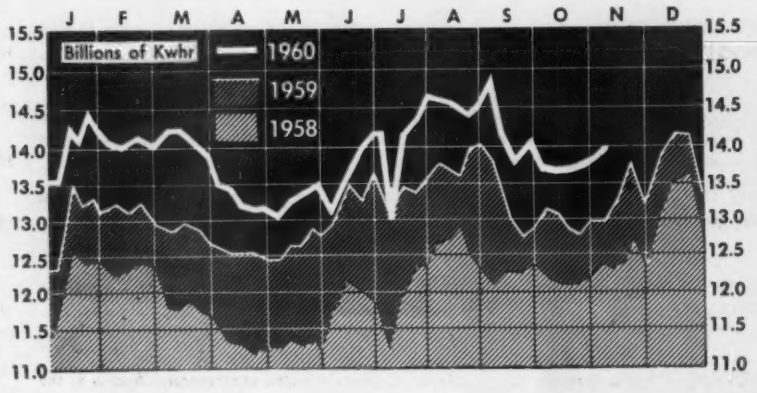
The Federal Power Commission has issued its 12th annual (1959) list of the 15 most efficient steam electric generating stations in the US. The table below shows the ratings.

Station Name	Utility	Btu/Kwhr
1. Dickerson	Potomac Elec Power	9,007
2. Clinch River	Appalachian Power	9,011
3. Kanawha River	Appalachian Power	9,098
4. McMeekin	So Carolina Elec & Gas	9,130
5. Muskingum River	Ohio Power	9,170
6. River Rouge	Detroit Edison	9,170
7. Clifty Creek	Indiana-Kentucky Elec	9,173
8. G. G. Allen	Duke Power	9,174
9. Tanners Creek	Indiana & Michigan Elec	9,176
10. Shawville	Pennsylvania Elec	9,179
11. Kammer	Ohio Power	9,203
12. St Clair	Detroit Edison	9,250
13. Kyger Creek	Ohio Valley Elec	9,284
14. Portland	Metropolitan Edison	9,322
15. Oak Creek	Wisconsin Elec Power	9,336

Out-of-court settlement of the power switchgear assemblies criminal antitrust case in Philadelphia appears to have fallen by the wayside. The trial, at press time, was scheduled for today, and General Electric and Westinghouse were expected to argue for delay or moving it to another city. Antitrust Chief Robert Bicks told *Electrical World* of the new trial date and restated the objections of the Justice Department to accepting *nolo contendere* pleas. An out-of-court settlement would probably have set the pattern for other cases.

Management Changes—R. R. Jewell named vp and general manager of Wheeling Electric Co . . . C. W. Elston made general manager, large steam turbine-generator dept, GE, to succeed W. E. Saupe who retires. Alan Howard is now general manager, gas turbine dept.

WEEKLY POWER OUTPUT—Up 7.4% (Week ending Nov. 5), Kwhr 13,982,000,000



Per Cent Change From Previous Year

	Oct. 22	Oct. 29	Nov. 5
Total U. S.....	+ 8.2	+ 7.0	+ 7.4
New Eng.	+ 4.4	+ 3.9	+ 5.7
Mid. Atlan....	+ 5.8	+ 5.5	+ 6.5
Cent. Indust...	+ 7.8	+ 6.8	+ 7.7
West Cent. ...	+10.2	+ 7.8	+ 7.7
Southeast	+ 9.3	+ 6.9	+ 7.0
South Cent. ...	+10.6	+ 9.2	+ 5.3
Rocky Mount...	+ 9.5	+ 8.1	+13.4
Pacific			
NW	+ 6.5	+ 6.1	+15.8
SW	+ 9.6	+ 9.6	+ 9.9

Seasonally Adjusted Index 271.5
Week Ago 272.6 Year Ago 251.3

Source: Edison Electric Institute

Supply Lines

COAL FREIGHT RATE INCREASE IS NOT ACROSS THE BOARD

With new 7¢-per-ton freight increases on coal in effect over much of the nation, utility fuel men last week were figuring out their new higher fuel bills. The higher rates also applied to coastal points in the Middle Atlantic area where the Interstate Commerce Commission just a few weeks earlier had confirmed freight reductions averaging 50¢ a ton on incremental shipments. Coal men were still trying to appraise the effect of the new freight rates on their competitive balance with oil in this area. As far as could be determined at midweek, most railroads were applying the higher rate on all interstate shipments of coal and on all but a few of the intrastate shipments.

Among the exceptions were shipments to Tennessee Valley Authority's Widows Creek plant. Spokesmen for both TVA and L&N Railroad said the contract negotiated in August cannot be changed except by further negotiation. Regulatory commissions in Kentucky, Virginia, and West Virginia had not yet approved the higher freight rate for intrastate shipments. In a separate action, Chesapeake & Ohio Railway announced that it was setting a special rate for coal shipments to Kentucky Power Co's Big Sandy plant in return for a guaranteed percentage of the shipper's tonnage.

In Washington, ICC set a hearing for Dec. 1 to determine the effect of the freight rate increase on large coal users. It is expected that the ICC hearing will focus particularly on areas in which coal runs into tough competition from other fuels.

PURCHASING EXECUTIVES SHOW LACK OF OPTIMISM, REPORT PRICE BREAK

"A general business situation charged with somewhat more pessimism than optimism," is the way the business survey report of the National Assn of Purchasing Agents characterized the economic picture for October. The report noted "a rather noticeable break in prices . . ." for the month and listed some items of electrical equipment as being on the "down side." This equipment had not been listed among the price movements in September, but had been listed on the "down side" for six previous months. While the percentage of PA's reporting price rises was not great, it was somewhat of a reversal of the price firming they had been reporting during the past two months. Still 82% of the purchasing executives from all segments of industry said prices were holding at high levels during October. Commented the report, "There will be little acceptance among buyers of any price increases in the near future."

Pace of inventory liquidation for all industry is slowing, but the trend continues, said the NAPA report. Purchasing men indicated they believe the downward trend will continue through the remainder of the year.

ANOTHER MANUFACTURER RAISES INSULATOR PRICES IN WESTERN ZONE

Price increases of 3½% on all insulators for ten Western states was announced by the Thomas Works of Delta-Star Electric Division of H. K. Porter Co Oct. 31. The new price differential applies to Washington, Oregon, California, Nevada, Arizona, Utah, Idaho, Montana, Wyoming, and New Mexico. The increase was necessitated by freight costs on shipments to this area, the company said.

The Delta-Star move followed a similar zone price differential announced in late September by the A. B. Chance Co. The Chance differential applied also to

Colorado, which Delta-Star excluded. A competitive manufacturer commented, "How can you expect to raise prices when present prices are still soft?" Another manufacturer said prices on insulators were occasionally quoted 5% to 10% below market prices, and the situation in the Chicago area was particularly chaotic.

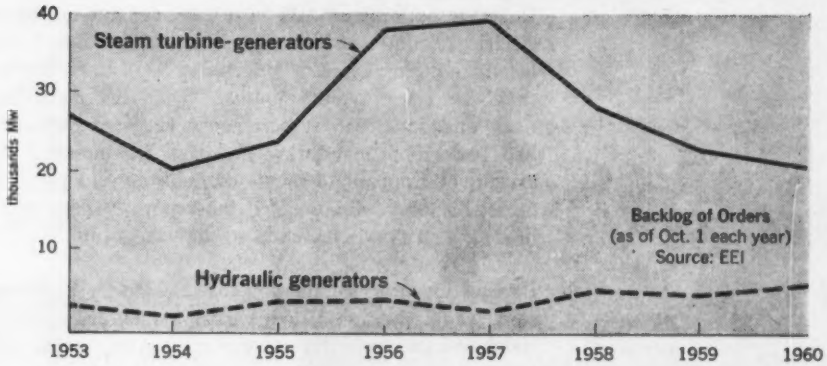
BACKLOGS ARE MIXED FOR HEAVY ELECTRICAL ITEMS

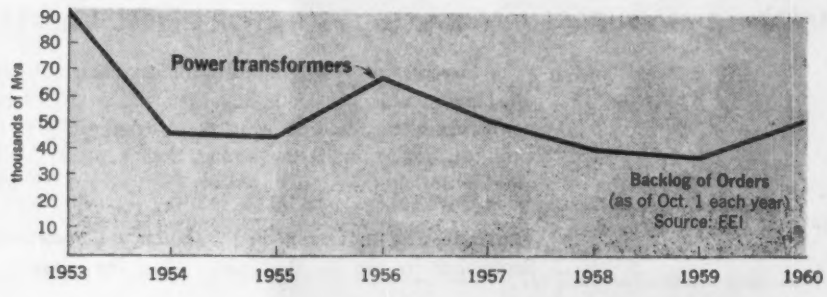
Order backlog for large steam turbine-generators was at a six-year low as of Oct. 1, but backlogs for hydraulic turbines and power transformers were up from the same date in the previous two years. Charts below show the backlogs based on the 28th Semi-Annual Electric Power Survey issued by Edison Electric Institute.

• **For steam turbine-generators,** 10 Mw and larger, the backlog continues to decrease and is the lowest reported at the end of any quarter during the past ten years with one exception. The exception was for the end of the third quarter in 1954. For smaller steam turbine-generators, below 10 Mw, the Oct. 1 backlog was higher than reported at the end of the first quarter this year, but lower than at the end of any previous quarter on record.

• **For hydro generators,** the Oct. 1 backlog was slightly lower than that reported at the beginning of 1960 but higher than any backlog previously reported.

• **For power transformers,** EEI commented that as of Oct. 1 of this year there was open manufacturing capacity of 8 million kva still remaining for 1960 delivery. Of the 37,200 Mva of power transformer capacity scheduled for shipment after Jan. 1, 1961, a full 37% is not scheduled for shipment until 1962 and later.





LINE MATERIAL FINDS "A BETTER WAY"

Close-up of Peltier thermoelectric device. Spring tension on the heat pumps automatically adjusts the device to different lamp bulb diameters. Can be used with any T12 through T17 lamp. L-M's Peltier device is presently available only for 6-foot, 4-lamp shallow luminaires.

This six-foot, four-lamp shallow luminaire utilizes four L-M Peltier thermoelectric heat pumps for spot-cooling the fluorescent lamps. In the heat pump, direct current flows through a series of junctions of dissimilar metals, alternately absorbing heat in one junction and liberating heat in the other. The cold junctions contact approximately one-half square inch on the lamp bulb walls thereby maintaining the mercury vapor pressure within the lamps at the optimum value for maximum light output.

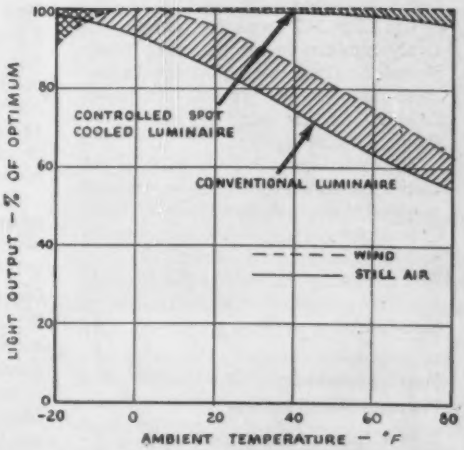
L-M's Revolutionary New Development Keeps Fluorescent Output at Maximum

by **STACY STANDLEY,**
Product Manager, Lighting
Line Material Industries

Now—Line Material develops another important engineering advance in outdoor lighting—Thermoelectrically Cooled Fluorescent Luminaires. These luminaires solve the basic problem of fluorescent lamp lumen output variation caused by ambient temperature changes. Another vital contribution by Line Material Industries to better outdoor lighting.

L-M Lighting Development Engineers have ingeniously adapted the Peltier thermoelectric principle to spot-cool fluorescent lamps. By the simple process of cooling a small area of each lamp, internal mercury pressure is held at the optimum and light output is maximized regardless of ambient temperature.

Be sure you get complete information on L-M's latest contribution. Contact your L-M Lighting Engineer, or write direct to Line Material Industries, Outdoor Lighting, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Limited, Toronto 13, Canada.

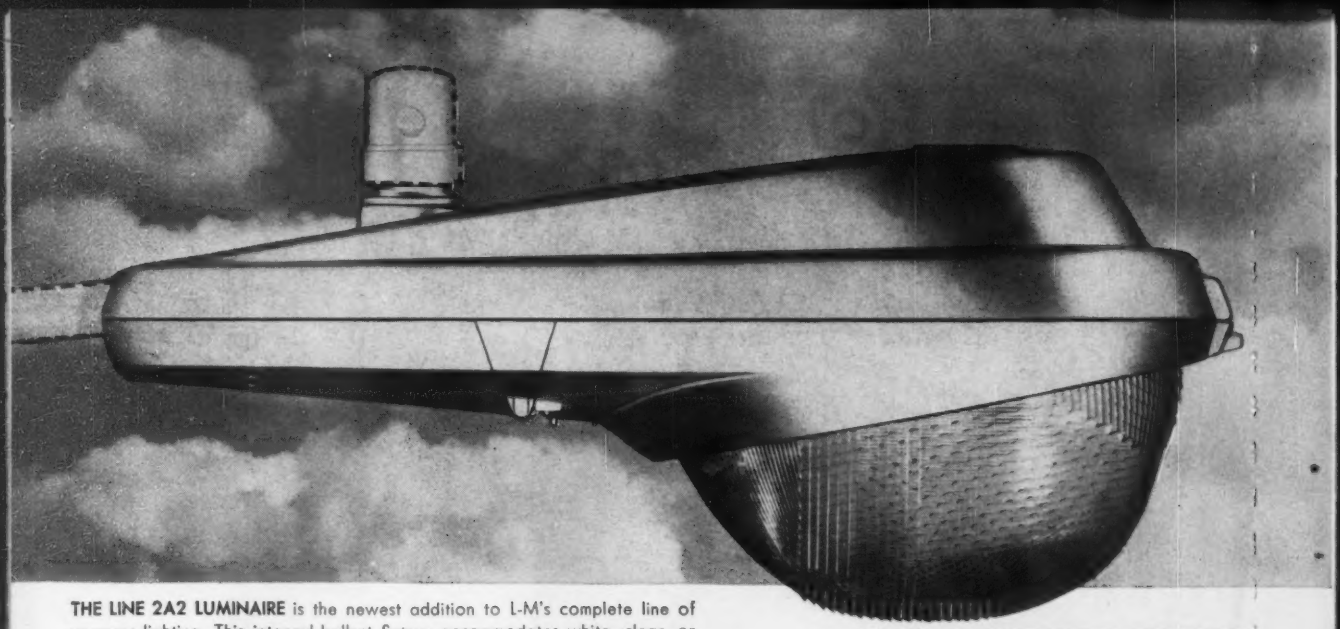


Performance curves of luminaires with and without controlled spot cooling: solid edge of band represents still-air conditions; dotted line represents 10 MPH of wind.

LINE MATERIAL® Industries Outdoor Lighting
McGRAW-EDISON COMPANY

McGRAW EDISON

DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES · FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS · OUTDOOR LIGHTING · LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE & CONDUIT



THE LINE 2A2 LUMINAIRE is the newest addition to L-M's complete line of mercury lighting. This integral-ballast fixture accommodates white, clear, or color improved mercury lamps through 400 watts, and can be adjusted for a choice of IES Types II, III or IV light distribution. Photo control also available.

L-M's New Line 2A2 Mercury Luminaire Has Self-Contained Integral Ballast For Low-Cost, Efficient Installation

Line Material's new integral-ballast Line 2A2 luminaire combines high lighting efficiency and fine photometric performance with functional styling and beauty. This latest addition to the L-M family of mercury luminaires is especially suitable for lighting residential and business streets, expressways, highways, white ways and shopping centers—wherever high lighting levels are desirable.

The Line 2A2 luminaires are distinctively modern in appearance. When mounted on their sweeping support arms, these new fixtures present continuous flowing lines that grace any area where they are installed.

The cast-aluminum body encloses the ballast, condensers, support-arm clamps, terminal block, lamp socket and reflector. The refractor is hinged and swings down, providing access to the lamp and reflector. The mounting clamps and the terminal block are accessible through a removable screw plate.

Fast Installation, Flexible Applications

L-M's Line 2A2 luminaire's "all-purpose" slipfitter permits mounting on either 1¼" or 2" pipe support arms. The specially designed clamps provide large contact areas that can not damage aluminum support-arm pipes. The luminaire is completely pre-wired with all connections brought to an accessible terminal block that lies in line with the incoming conductors. All Line 2A2 luminaires can be mounted and connected in minutes.

Efficient Refractor Vari-Position Socket

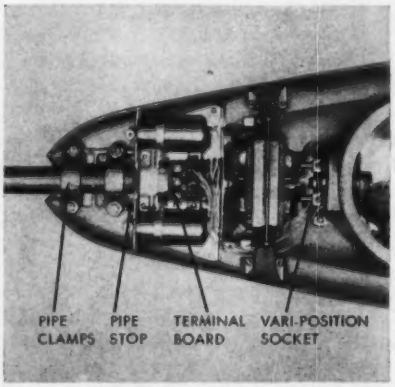
LINE 2A2 Mercury Luminaires incorporate an efficient Borosilicate Holophane refractor. The Vari-Position Socket permits a choice of IES Type II, III, or IV light distribution. This new luminaire is available with accommodations for photo control.

The light unit is completely gasketed to seal out insects and dirt—dacron between refractor and reflector, fiberglas between lamp and socket.

Get Complete Information

Be sure you get complete information on the new L-M Line 2A2 Mercury Luminaire. Ask your L-M Lighting Engineer for Bulletin No. 59176, or write Line Material Industries, Outdoor Lighting Division, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Ltd., Toronto 13, Can.

L-M's NEW LINE 2A2 integral-ballast mercury luminaire is completely contained within a cast-aluminum body. The light assembly is gasketed to seal out insects and dirt; the refractor is hinged for easy access.



L-M's NEW LINE 2A2 luminaire is completely self-contained and pre-wired for quick, money-saving installation. All-purpose slipfitter accommodates 1¼" and 2" pipe support arms.

LINE MATERIAL Industries Outdoor Lighting

McGRAW-EDISON COMPANY

437 R

DISTRIBUTION TRANSFORMERS · RECLOSERS AND OIL SWITCHES · FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT · PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS · OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE AND CONDUIT

McGRAW EDISON

HORACE E. BISHOP, peach and dairy farmer of Inman, South Carolina, tells Duke Power's Edwin O'Shields how the L-M Suburbanaire adds hours to his day, beauty and safety to his home.

THE ADDITION of this L-M Suburbanaire now permits launching and reloading of boats at Lee's Boat Haven, near Clover, South Carolina, any time of the day or night.

Duke Power Provides Low-Cost Lighting For Piedmont Carolinas

Rental plan for suburban and rural areas offers low-cost protective and convenience lighting for farms, filling stations, small townships.

The extensive Duke Power Company system includes 33 branches from the Virginia line to the southern boundary of South Carolina. One important aspect of this progressive utility company's merchandising and public relations program has been to sell its customers on better outdoor lighting.

To make such lighting available at low cost, Duke Power Company offers its customers individual photocell-controlled luminaires, such as L-M's Suburbanaire, on a full-service contract. For $3.00 a month, the company supplies the unit itself with a 7000 lumen mercury vapor or 6000 lumen incandescent lamp, pole, installation, service, and power, on a rental basis with a service contract.

The lighting plan is widely used in the Company's territory at farms, service stations and garages, industrial areas, and for small township street lighting jobs. Under the plan, which has been in operation only since October, 1958, the utility has several thousand units in service.

How-To-Do-It Information

For details on how Duke Power Company and other utilities have put the plan into operation, ask your L-M Field Engineer or Lighting Engineer; or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials Ltd., Toronto 13, Ontario.

THE L-M SUBURBANAIRE is a specially designed, easy-to-maintain open-type unit, available with photocell and for either incandescent, or with ballast for mercury vapor lighting. High efficiency is achieved with scientifically designed reflector-refractor combination. Available in IES types I, II, III, V, and 4-way type II light patterns.

404

LINE MATERIAL® Industries Outdoor Lighting

McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

McGRAW EDISON

D. I. S. STRIPS 10-INCH SCALE FROM 12-INCH PIPELINE IN JUST ONE DAY!

Dense scale deposits of oxides, sulfides and sulphur—10 inches thick in some places—clogged a 12-inch fuel supply line. Dow Industrial Service engineers stripped every trace of deposits from this 750-foot pipeline—restoring full capacity—in *just 24 hours!*

Solvents and a pipeline pig did the job. But for different conditions, D. I. S. uses other techniques to get the same result. For example, when scale blocked a 24-inch, quarter-mile-long waste line, D. I. S. engineers knocked out the deposits with a special D. I. S.-designed jet mole. Though this underground pipeline was buried 10 feet deep, D. I. S. cleaned it completely in only 16 hours!

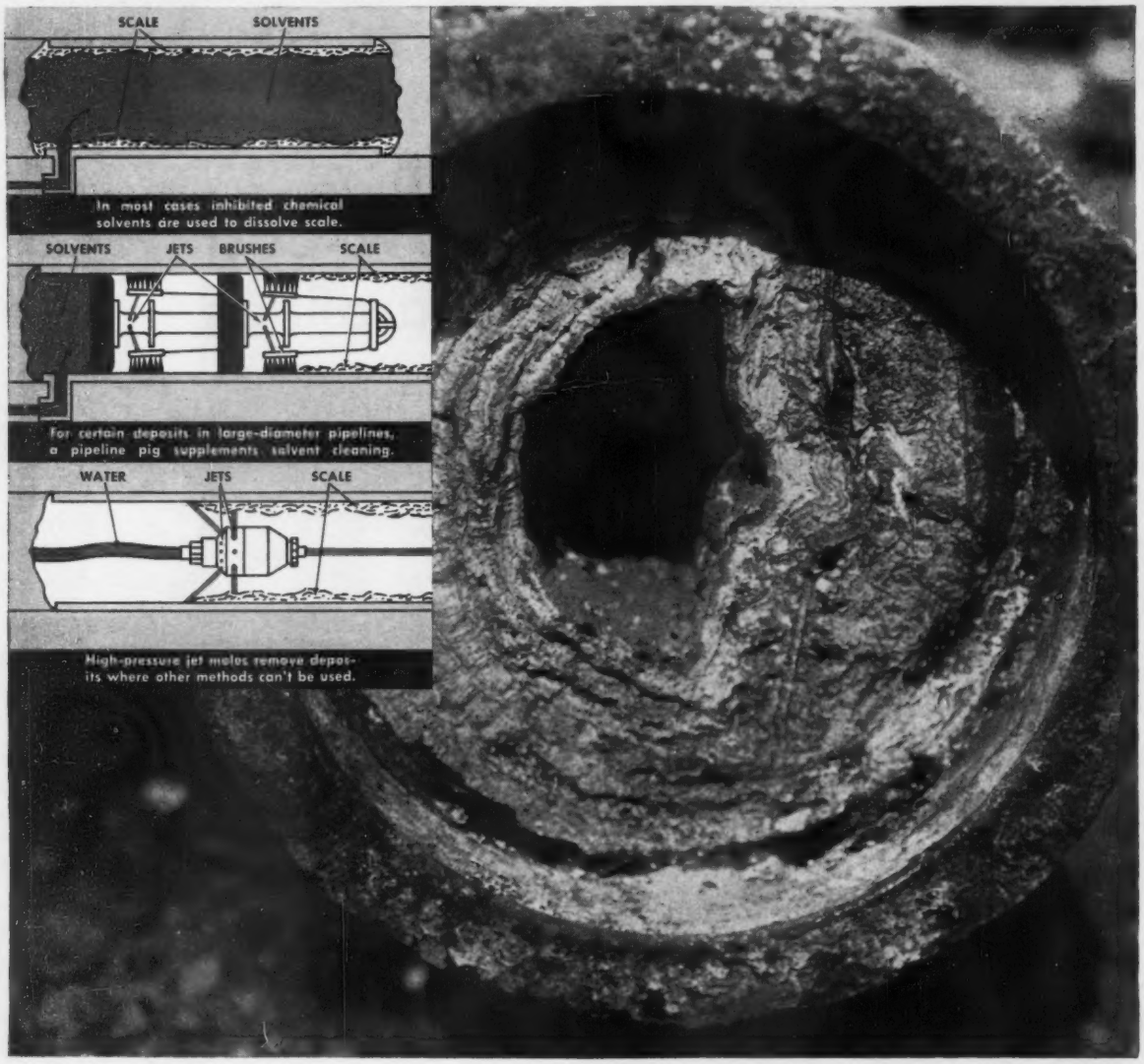
Nation-wide Dow Industrial Service first analyzes the job to be done, then selects the technique which will do the best job, fastest. D.I.S. cleans all kinds of lines—fresh water, boiler feed-water, gas, waste and other lines—and every kind of process and heat exchange equipment.

In addition, D. I. S. offers complete consulting laboratory service for water treatment and waste processing problems, backed by the technical resources of The Dow Chemical Company. For cleaning *any kind* of equipment, *anywhere* in the U. S., write or call DOW INDUSTRIAL SERVICE, 20575 Center Ridge Road, Cleveland 16, Ohio.

DOW

DOW INDUSTRIAL SERVICE • Division of The Dow Chemical Company

From these three methods, D. I. S. selects the one best suited to your specific pipe-cleaning problem.



here it is! A REAL

ONE-HAND TOOL

installs
INSULINK® and LINKIT®
one crimp per end!

You'll like this ONE-HAND TOOL ... from start to finish, you can really work it with only ONE HAND. You can close it with less than a 50 lbs. squeeze; it weighs only 2½ lbs. and is only 12" long. You couldn't ask for an easier service tool ... it's the only *real* ONE-HAND TOOL.

Position the OH25 once ... and only once ... on each side of the INSULINK or uninsulated LINKIT. It has a new die that crimps the entire contact area at one time. You don't have to reposition, you can't overlap crimps, and you never make less than the proper number of crimps.

And, it takes only ONE CRIMP PER END ... a series of easy, ratchet controlled strokes to make a perfect crimp every time. The new dies cause the conductor strands to rub together, removing the oxide film for more stable, low resistance connections.

Insert stripped wire ends into INSULINK; caps grip and hold conductors.

Get up close to your work. Position ONE-HAND TOOL on INSULINK only once per crimp.

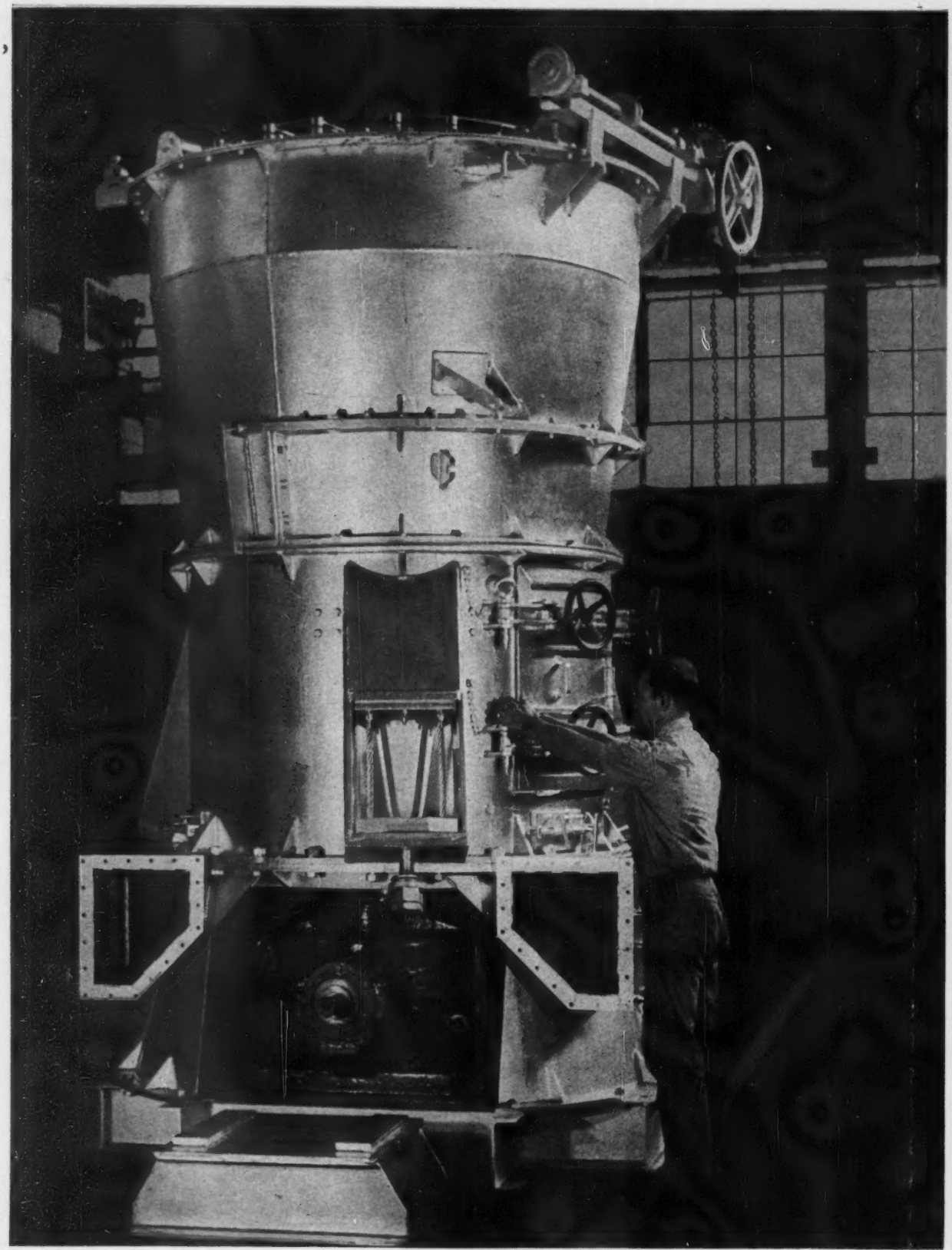
A series of easy strokes complet the crimp. Dies produce oxide removing wiping action betwee conductor strands.

ANOTHER MAJOR DEVELOPMENT IN THE

BURNDY

COMPRESSION PROGRAM

NORWALK, CONNECT. BICC—BURNDY Ltd. Prescot, Lancs., England In Continental Europe: Antwerp, Belg TORONTO, CANADA



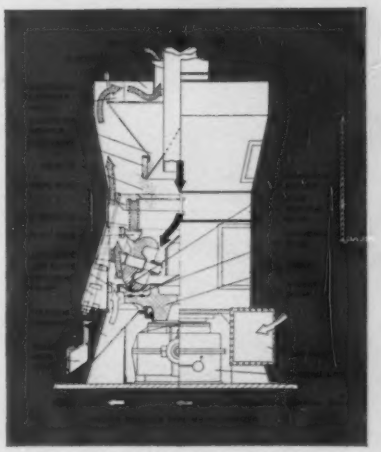
Foster Wheeler MB planetary roll and table pulverizer. Available with capacities from 2 ton/hr to 55 ton/hr.

Foster Wheeler MB Pulverizer, SIMPLE...VERSATILE...RELIABLE

The best combination of advantages for a wide range of fuel requirements

COMPARISON: Foster Wheeler MB pulverizer compared with two other leading pulverizers (A & B) available in U.S.

Power consumption	equal to A & B
Availability	better than A, equal to B
Accessibility	better than A & B
Floor Space	equal to A & B
Flexibility for suction or pressure operation	equal to A, better than B



European power companies have used the MB pulverizer for over 10 years. Low power consumption, low maintenance and the extremely high availability of the design are thoroughly proven.

Now further refined by FW engineers, and tested for two years in the U.S., the MB pulverizer deserves careful consideration in planning any fuel system which may require mill capacities from 2 to 55 tons of pulverized fuel per hour.

The MB design is extremely simple, providing reliability and ease of maintenance. The only moving parts inside the grinding area are three spheroidal rollers, a roller guide, and the powered horizontal grinding table. All adjustments can be made with the mill in operation.

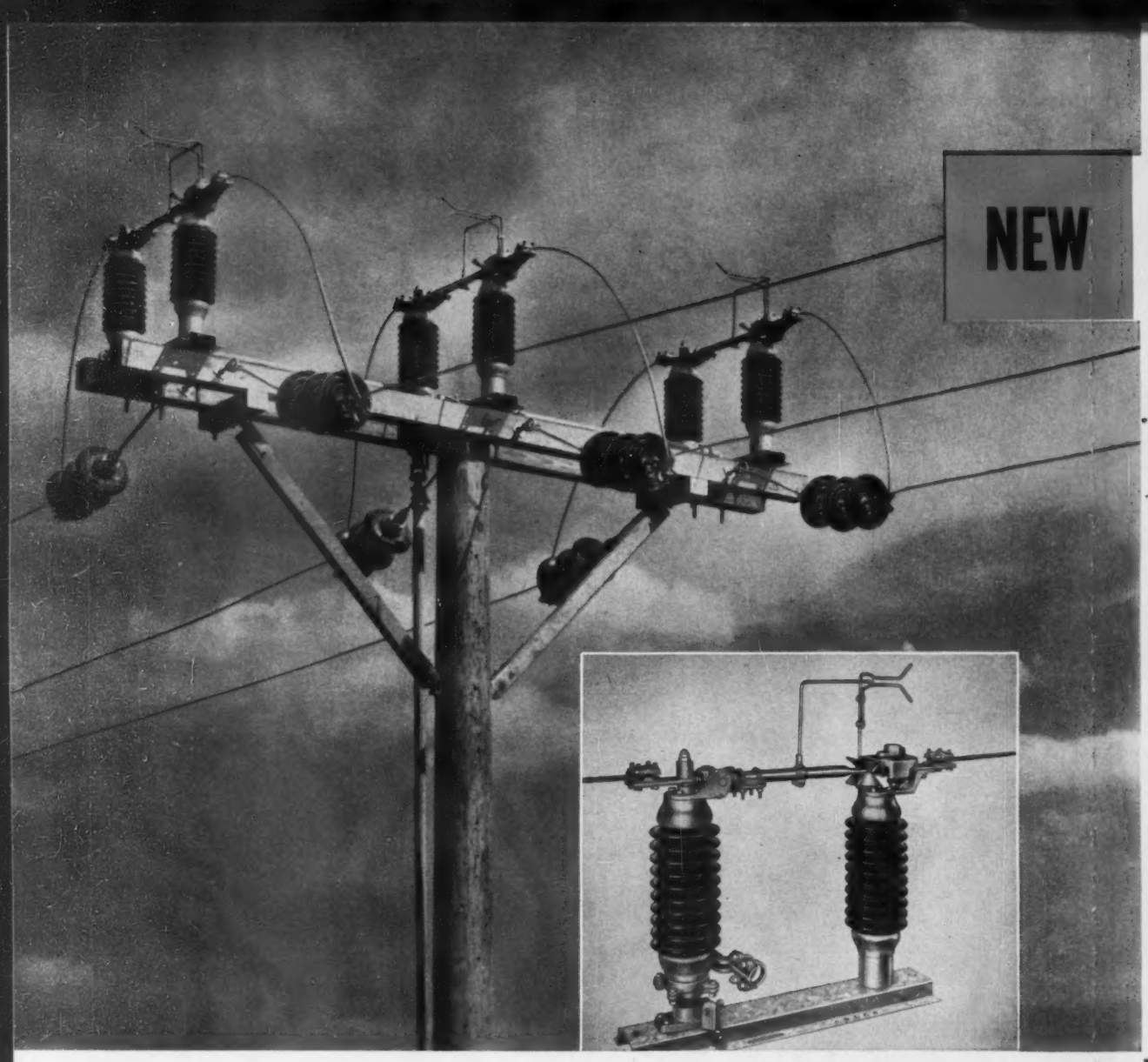
The planetary motion of the rollers maintains uniform product fineness. Wear of grinding surfaces is extremely slow. The rollers and carrier need no lubrication. Noise and vibration levels are very low.

Provision is made for either pressurized or suction operation. In addition to coal pulverizing, the MB mill is also available for grinding gypsum, cement, solid chemicals, pigments, food products and other commercial materials.

Write for Bulletin MB-58-1, giving more detailed specifications for the MB mill. Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, N. Y.

FOSTER WHEELER

NEW YORK LONDON PARIS ST. CATHARINES, ONT.



NO OTHER SIDE-BREAK DISCONNECT GIVES YOU ALL OF THESE OPERATING ADVANTAGES

- **Correct contact always maintained at blade tip even if crossarm warpage distorts the switch base.**
- **All blades engage fully in the break-contact jaws without precise adjustment of the inter-phase rods.**
- **Less time and labor to install with Kearney original wide-tolerance mechanical design.**
- **Easiest, surest ice-breaking ability available on both opening and closing.**

This newest Kearney development solves long-existing operating problems of crossarm mounted group operated side-break disconnects. The best supporting structure or crossarm construction may . . . due to ice loads, age, wind or line strain . . . deflect enough to distort the switch bases, or alter the relative positions of the three phases. This often causes loss of contact or failure of all blades to close completely in conventional disconnects with both rigid blades and stationary break-contacts.

Kearney's advanced design features a self-aligning blade constructed to permit controlled vertical movement and axial rotation. This automatically compensates for base distortion . . . keeps the blade tip correctly aligned in the contacts. The break-contact swings 30-degrees with the blade as it is opened or closed, producing high leverage ice-breaking ability and full wiping of the silver current transfer surfaces. On closing, the blade tip fully engages the break-contact before the contact moves from its angular open position, compensating for any shift in position of the switch bases. This same feature also allows considerable freedom in interphase rod adjustment, enabling Kearney *Self-Aligning* side-break switches to be installed faster and more economically than other types.

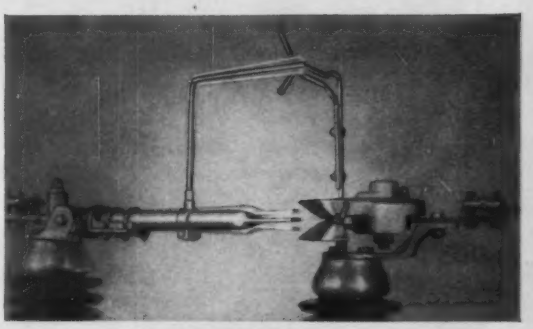
The details of these original features for maintenance-and-adjustment-free operation are shown on the facing page.

Kearney's

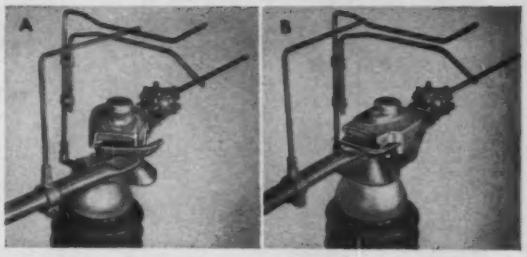
Self-Aligning SIDE-BREAK DISCONNECTS

...always make positive contact, even if the supporting structure warps, twists, bows or settles.

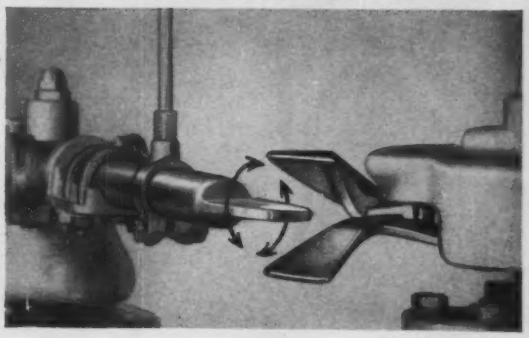
Self-aligning blade moves in a vertical plane to re-establish the original relationship between blade tip and contacts if supporting structure warpage distorts switch base. Wide mouth contact jaws assure blade entry into the contacts. Vertical 1¼" movement more than corrects for extreme cases of misalignment.



Break-contact swings 30° in the plane of blade travel as switch is opened or closed, providing highest leverage ice-breaking and full wiping of the current transfer surfaces. Note that the blade tip is fully engaged, and full contact is maintained (A) through the final 20° of blade travel to the fully closed position shown at (B). This feature allows more latitude in phase rod adjustment than other designs.



Blade rotates 12° on its longitudinal axis. If base distortion has affected blade-contact alignment, the blade tip will rotate as it enters the break-contact to keep all contact surfaces parallel, automatically restoring contact alignment. Friction reducing construction at all rotation points minimizes operating effort.



Switch carries full-rated load current well within NEMA temperature rise, from a fully closed position to 20° partially open position. Ratings available, 7.5 through 69 kv, 600 amperes. Equipped with conventional or whip-type arcing horns... torsional or spade-type operating mechanism. May be mounted horizontally, vertically, or underhung.

For full details talk to your Kearney representative, or write direct for Bulletin 8B.

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

397

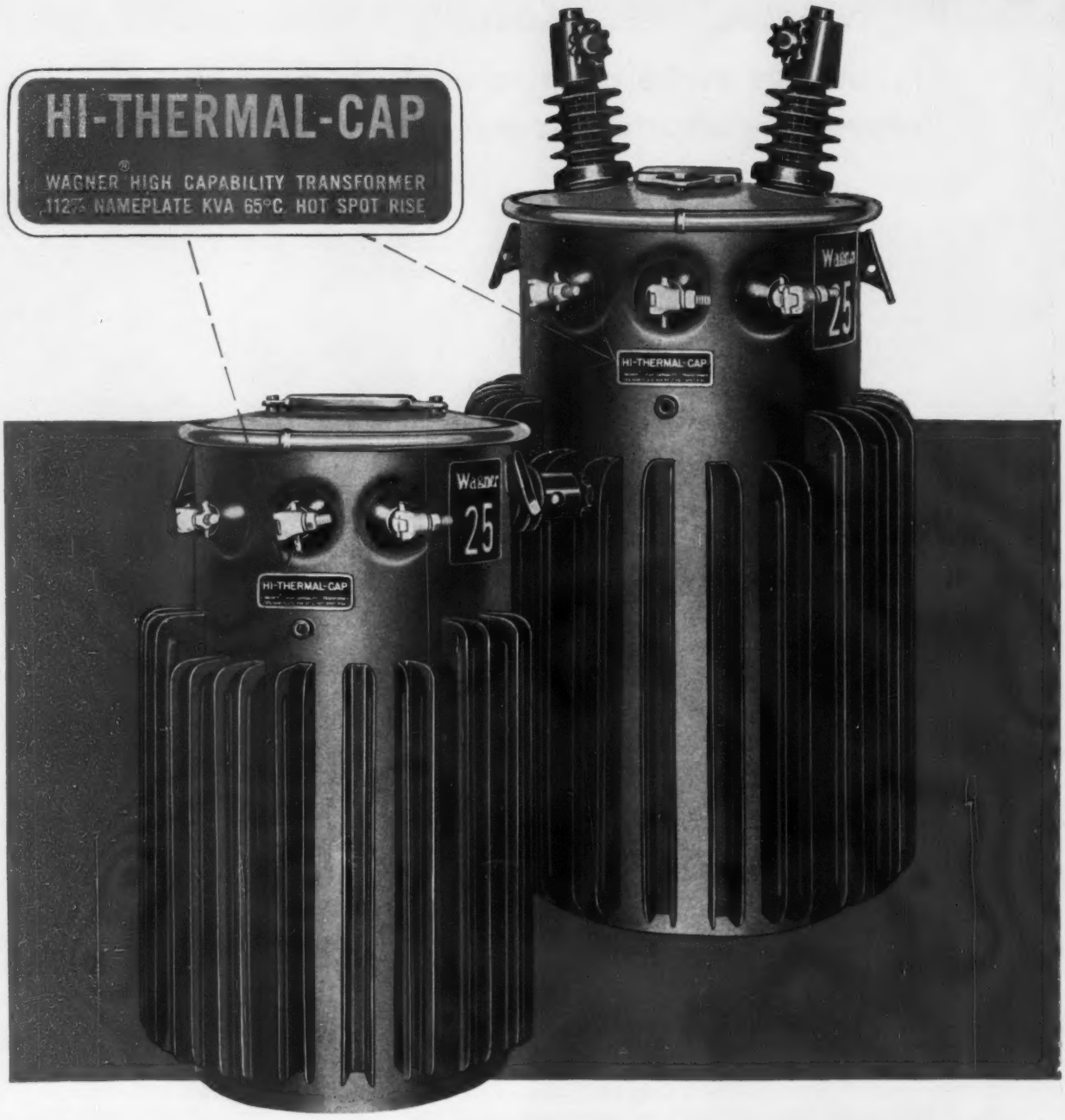
FOR BETTER CONSTRUCTION... SAFER MAINTENANCE

Specify Kearney Products

Plants at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

Get more usable Kva for your

with WAGNER®



SERVING 2 GREAT GROWTH INDUSTRIES—*ELECTRICAL...AUTOMOTIVE*

distribution transformer dollar

HI-THERMAL-CAP *TRANSFORMERS*

Every dollar you invest in Wagner® HI-THERMAL-CAP Transformers really buys a dollar and twelve cents worth of usable Kva. For you can safely uprate these High Capability Transformers to 112% of their nameplate Kva without shortening normal life expectancy... without exceeding the allowable 65°C hot spot temperature rise.

HI-THERMAL-CAP Transformers have new, compact coils wound LV–HV–LV on one insulating cylinder. Corrugated oil ducts and thermosetting barrier insulation lock the sections into a unit of great mechanical strength. Coils have been subjected to short circuit tests using 50 times normal current (two times as great as the industry standard) without failure.

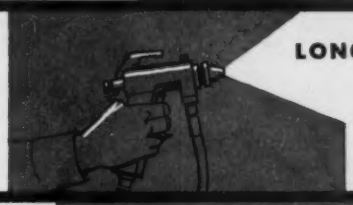
The HI-THERMAL-CAP element, which combines this improved coil with a wound core of cold-rolled oriented grain steel, has excellent electrical characteristics: low impedance for better voltage regulation; low core and copper loss for economical operation. You get full efficiency plus high capability with new Wagner HI-THERMAL-CAP Transformers.

HI-THERMAL-CAP Transformers, built in single-phase ratings 167 Kva and smaller, 15 KV and below (for direct pole mounting), are now available from factory, branch, and distributor stocks. Your Wagner Sales Engineer has complete information. Consult him, or write us.

MORE FOR YOUR MONEY IN MECHANICAL FEATURES:

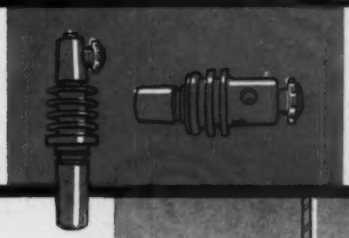
PLASTIC-COATED COVER

A porcelain-like coating gives improved corrosion resistance to tank covers, protects from line to ground, insulates small animals from the grounded cover to prevent outages. Applied to the covers, clamping ring and cover bolts, it is available without extra cost on all transformers with cover mounted bushings.



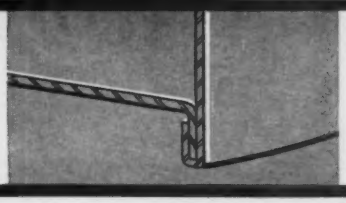
LONG LASTING TANK FINISH

A new formula anti-corrosive paint, carefully applied and thoroughly cured, provides a "Sure Seal" finish that withstands all temperature changes—is much longer lasting in corrosive atmospheres.



SAFETY KEYED BUSHINGS

Heavy wet-process porcelain high voltage bushings are safety-keyed. All terminals are key-locked in the tank wall. Hand tightening terminals are easily hooked up without tools. All bushings are suitable for use with either aluminum or copper conductor.



ROLLED-UNDER BASES

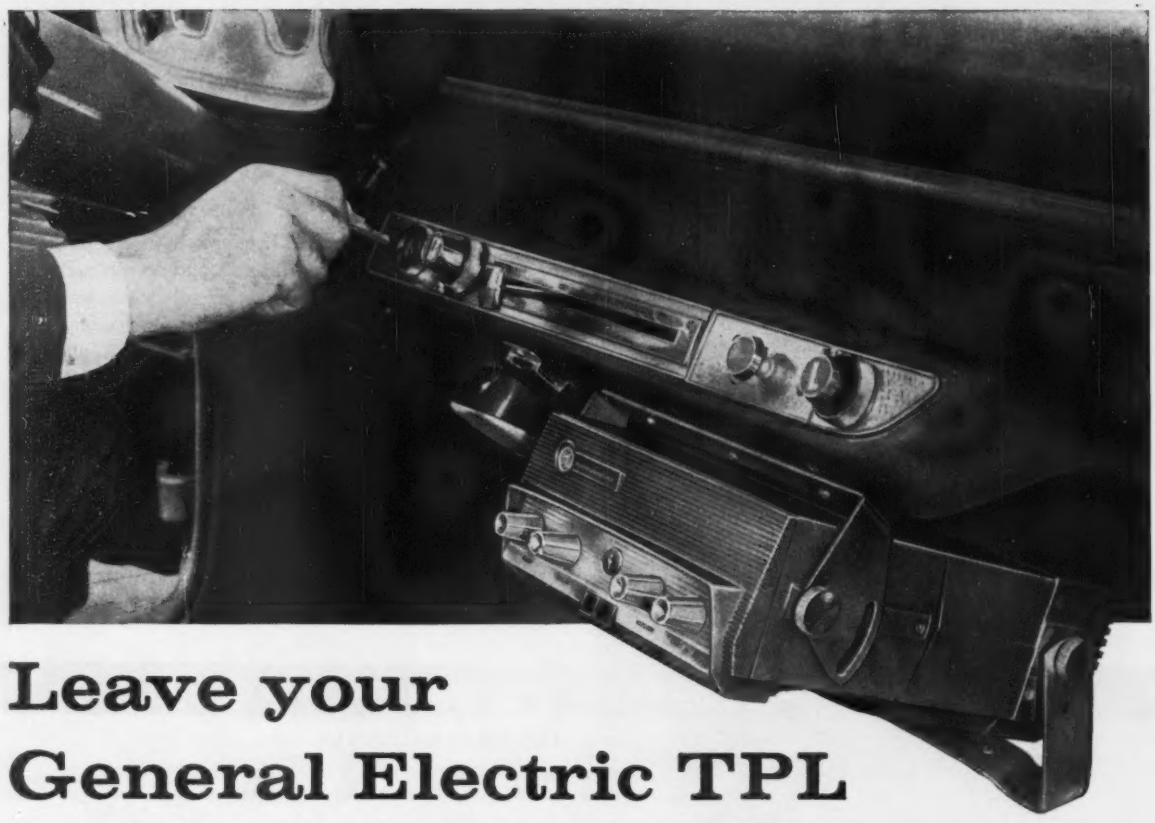
This new base design provides extra strength . . . better moisture drainage. Serves as an additional safeguard against leakage of oil from the tank. It lessens the chance for finish damage due to scraping.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

6456 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

WT60-30



Leave your General Electric TPL 2-way radio on while your engine is off!

LOWEST BATTERY DRAIN AVAILABLE

Other makes of mobile radio drain your battery severely, even on standby. Unless you keep the engine running, this will inevitably shorten the life of your battery. And if you *do* run the engine while your vehicle is standing still, you're letting yourself in for a whole series of other problems—increased gas consumption, increased engine wear, special generators, etc.

Not so with TPL! Standby battery drain on General Electric's new Transistorized Progress Line is so low you need never turn off the TPL unit in your vehicle. By actual measurement, drain is less than 40 milliamperes, or only 1/25 of the current that runs your dome light. And even when the receiver is talking, drain is only 540 milliamperes.

With only four tubes in the TPL transmitter, you require no special generator, use less gas and need fewer engine jobs. The cost of operating your two-way radio system goes way, way down.

Get the full story on TPL—the smallest, most reliable two-way radio you can buy today. Write General Electric Company, Communication Products Dept., Sect 9110-14, Mountain View Road, Lynchburg, Virginia.

GENERAL ELECTRIC

Why utility engineers now specify

POWER CABLE INSULATED WITH MONSANTO POLYETHYLENE

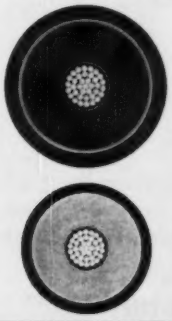
• better abrasion resistance • lower power factor; less power loss in transmission • low surface tracking • excellent moisture resistance • less bulk, less weight

Leading manufacturers now produce power cable insulated with polyethylene based on Monsanto Polyethylene resins, specially developed and perfected by Monsanto. For complete technical data including applicator's information, write to Monsanto Chemical Company, Plastics Division, Room 730, Springfield 2, Massachusetts.

Monsanto

MONSANTO ACTIVATOR IN **PLASTICS**

Note the slim shape and size of the polyethylene-insulated cable (lower), compared to the old cable (upper) being replaced.

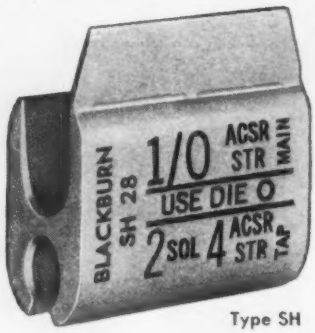


New 15,000 volt polyethylene-insulated power cable installation at main sub-station, Monsanto Chemical Co., Plastics Division plant, Springfield, Mass. Installation-rated at 175 amps, 15,000 volts. 3-phase system, 1 conductor per phase. Conductors are 2/0-37 strand copper (133,100 circular mils). Insulation consists of: 1 layer semi-conducting tape, 297 mil polyethylene insulation, 1 layer non-metallic tape, metal shielding, 1 layer tape, 6/64" vinyl jacketing.

ENGINEERED INTO
BLACKBURN'S
COMPRESSION CONNECTORS

High Conductivity-

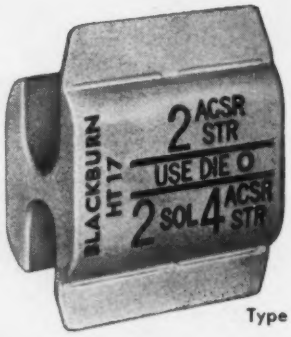
Blackburn has engineered all compression connectors shown to fit your present tooling program—and added advantages to meet engineers' and linemen's requirements.



Type SH

Type HT Prefilled

Type SH Prefilled

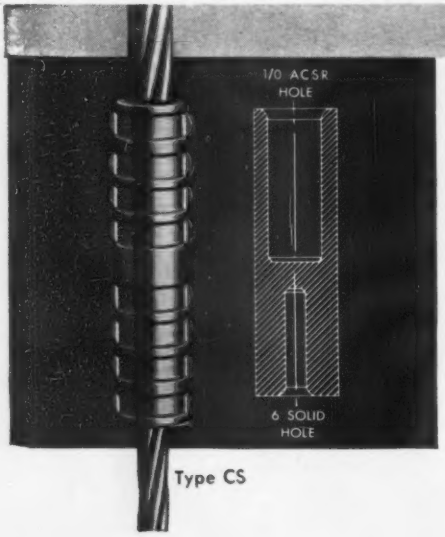


Type HT

Standardization now possible with Blackburn "H" frame connectors

- **Designed to fit the tools you already have for applying "H" frame type connectors.**
- **Full length tab completely seals out moisture, easiest to bend and install!**
- **Surface treated to improve conductivity and retard corrosion.**
- **Prefilled with Blackburn's superior oxide-inhibiting compound, Contax, in easy-tear tab vacuum package.**
- **Color fast, large, easy-to-read lettering.**
- **Type HT is reversible, both grooves "open". For large aluminum tap to smaller copper main. Also used for dead ending.**

Licensed under U. S. Patent No. 2,707,775



Type CS

You get higher conductivity with Blackburn service entrance sleeves

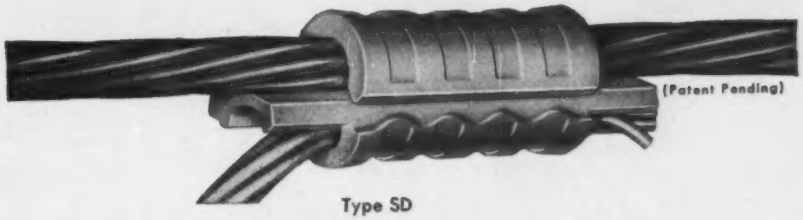
Blackburn—and Blackburn *alone*—provides greater contact area where needed, to assure greater conductivity. This is accomplished by increasing hole depth as the diameter of the conductor is increased, thereby providing more contact area for the conductors being connected.

The Color Coding is *printed* for quick, positive identification.

The sleeves' ends are sealed with Aluminum Sensitized Tape, which is easy to puncture . . . and, if a particle of the seal is pushed into the chamber, the particle is conductive.

Contax, Blackburn's superior oxide-inhibiting compound, is already in these sleeves *in measured amount.* Won't squirt out on glove or in face. And the solid center stop in a Blackburn Sleeve assures proper distribution of the inhibitor around the conductors. Designed for tooling you have.

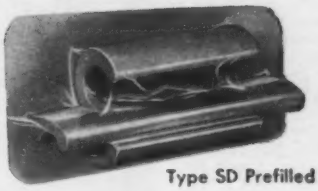
High "Use-Ability"



Type SD

Exclusive drip-guard separator in Blackburn 6-frame tap connector gives *extra* protection to bi-metallic connections

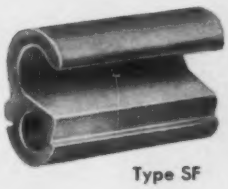
- Spacer allows SD Connector to be used for bi-metal connections with the tools you already have for "C" Frame type connectors.
- An economical substitute for "L" taps, since extended drip guard gives extra insurance against corrosion products bridging the bi-metallic gap.
- A true *two-handed* connector, very adaptable for hot line work.
- Surface treated for highest conductivity and corrosion resistance.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



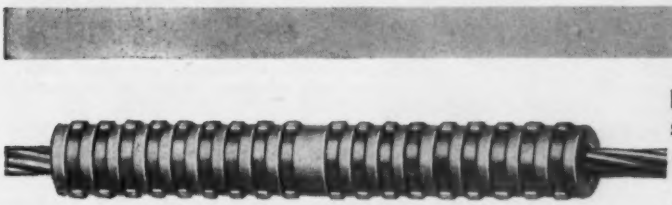
Type SD Prefilled

Type SF

- Recommended for aluminum to aluminum.
- Spacer gives better protection against strand breakage.
- Can be installed with same tooling used for Type SD.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SF



Type TR

Blackburn neutral repair sleeves save dollars on triplex services

- Salvage short lengths of pre-assembled service drop cable with Blackburn Sleeves.
- Designed for and tested with the tools you already have.
- Extra length engineered for neutral pullout values in keeping with dead end devices.

See JB Catalog 858 for Tooling INFORMATION

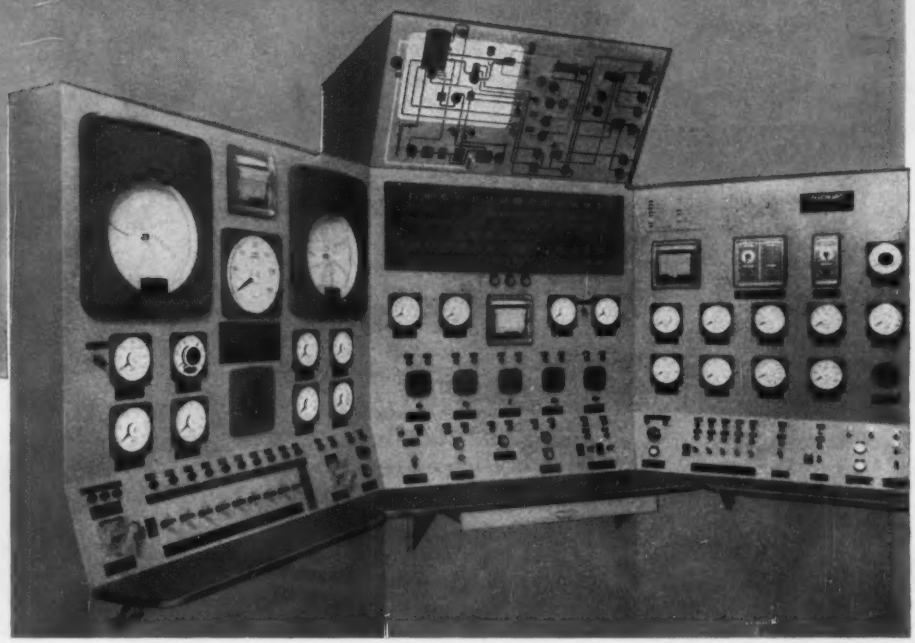
LIVE BETTER ELECTRICALLY

JASPER BLACKBURN CORPORATION

1525 Woodson Rd., St. Louis 14, Mo. • WYdown 3-9430

for Arctic nuclear power plant . . .

Foxboro electronic Consotrols to operate 24 feet under ice!



Instruments on Foxboro-designed Console indicate, record and control reactor temperatures, flow, steam generator level, pressures, conductivity, as well as computing Btu's. Pressurized-water type reactor was designed and built by Alco Products, Inc., Schenectady, N. Y., for the U. S. Army Corps of Engineers.

Snow-Millers are cutting tunnels to connect various facilities of Camp Century. Under-ice equipment will be fully protected from Arctic environment.

24 ft. deep tunnels are covered permanently with metal strips. Powdered snow, blown back over them, forms roof of tunnel.

Instrument reliability a must at this Army base in Greenland

A complete community, buried 24 ft. under the ice — this is the U. S. Army's Camp Century, now under construction on the Greenland icecap, 800 miles from the North Pole.

The Foxboro-instrumented nuclear power plant — built on 10 separate skids — will provide power for the remote base. Its core of uranium will produce a year's supply of steam and electricity before refueling.

For this installation, where reliability is so critical, dependable Foxboro electronic Consotrol* instruments were specified. 100% solid state — no vacuum tubes to replace — instantaneous response. Instruments have been performance-proved to operate down to —20F, and to withstand storage temperatures as low as — 50F. Foxboro console can be easily operated by one man.

Foxboro electronic Consotrol instruments are especially suited for nuclear power control systems. Ask your Foxboro Field Engineer to show you the reasons why. Or write for Bulletin 1-17A. The Foxboro Company, 2411 Norfolk Street, Foxboro, Massachusetts

Reg. U.S. Pat. Off.

FOXBORO

REG. U. S. PAT. OFF.

UNIT PACKAGING

IMPROVES DELIVERY; CUTS INVENTORY AND COSTS!

G&W's unique Unit Packaging program saves you time and money. Every component, device, and accessory required for the installation of a G&W standard Pothead or oil-filled Cutout is quickly gathered from "off-the-shelf", carefully and securely packaged, and sent to you *complete* in a single carton or crate. Once put into your inventory, it is a simple matter to take from stock as many individual boxes as required, load on a line truck, unpack right at the job site, and put the units into service in short order. You not only effect substantial savings on inventory control and handling, but materially cut installation costs.

Unit Packaging is another benefit you gain from G&W's constant development of cable accessories and switchgear. Further proof, too, that you are dollars ahead by relying on G&W's 55-year record of dependability and quality. A G&W representative will assist you in solving any cable accessory or switching problem, or write us for full detailed information.

A standard capnut pothead ready for shipment as a typical unit package.

All components and oil for three, gang-operated oil-filled cutouts are shown in this typical unit package.

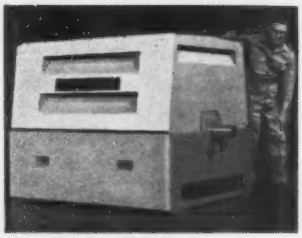
G&W ELECTRIC SPECIALTY COMPANY

3500 West 127th Street, Blue Island, Illinois

CANADIAN MFR. • POWERLITE DEVICES, LTD. • TORONTO, MONTREAL & VANCOUVER

superior quality standards — inspired specialized design

G60-2

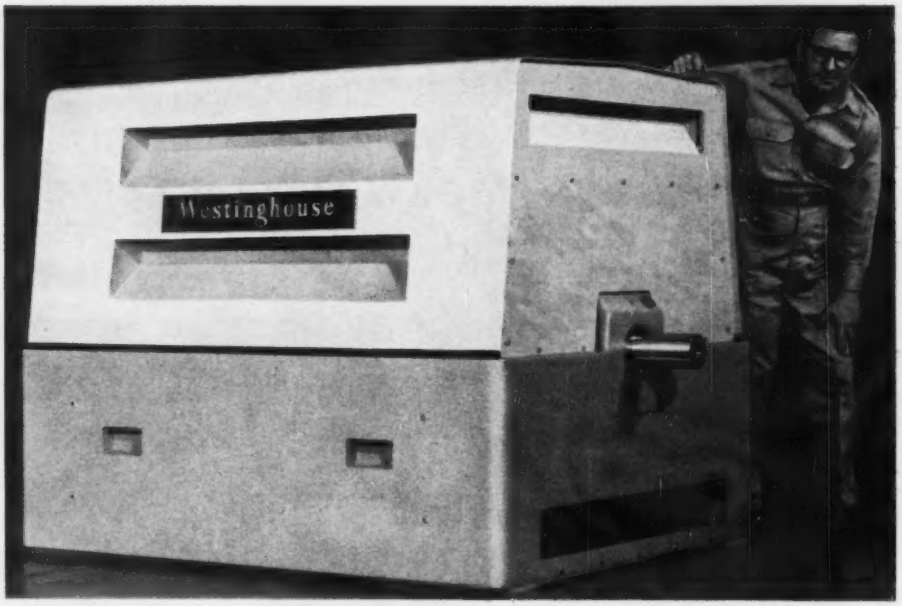


More Value For Your Large Motor Investment . . .

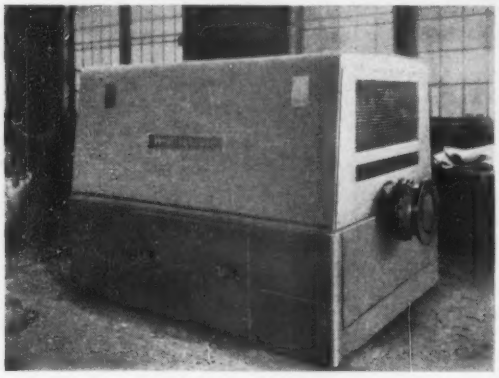
Westinghouse F/A Motor design

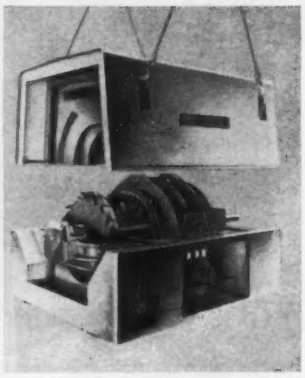
There's an F/A Motor enclosure to meet any of your installation requirements with standard horizontal drip-proof construction . . . NEMA weather-protected enclosures for normal *and* totally unprotected outdoor locations . . . totally enclosed fan-cooled tube-type motors and those having a cooler or heat exchanger.

Each sturdy F/A Motor enclosure is completely separate from the stator and can be removed in minutes for thorough visual motor inspection. In addition, inspection of leads, connections, windings and bearings is simple and quick . . . complete motor disassembly and reassembly take an average of only 3½ hours! Result: unmatched accessibility. This accessi-



Standard horizontal drip-proof enclosure for F/A Motors (at right) gives full accessibility. Cover can be quickly lifted off; removing end panels allows routine inspection of windings and bearings; end panels, covers and air shields can be removed in only 38 minutes, replaced in 56—with the motor still in running condition.





TEFC tube-type F/A Motor enclosure is shown at far left. The tubes are all mounted in top of enclosure, as shown in the next picture, and the motor is completely accessible when enclosure is removed.

YOU CAN BE SURE...IF IT'S

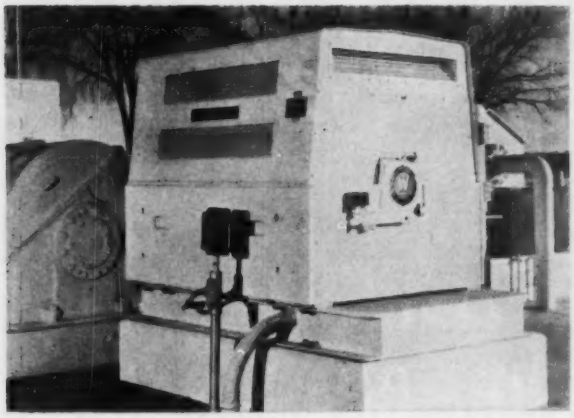
wraps economies in a variety of enclosures

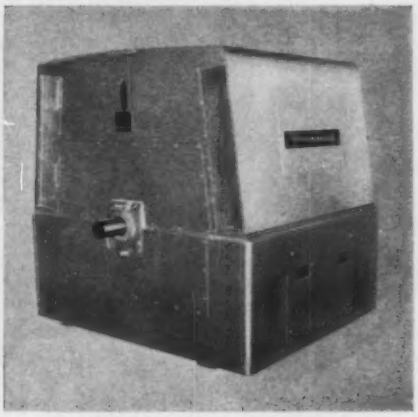
bility, coupled with the time-tested and -proved reliability of Westinghouse motor components, can save you up to 75% on inspection and maintenance.

THAT'S NOT ALL. F/A Motors have unique Thermalastic® insulation which has been protecting coils in more than 50,000,000 kw of Westinghouse large rotating apparatus. Extensive testing shows that Thermalastic has a probable 100-year life. And F/A Motors are super-quiet . . . virtually eliminate the annoying whine typical of large motors.

Check today for full information on Westinghouse F/A Motors. Your nearest Westinghouse representative has details . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

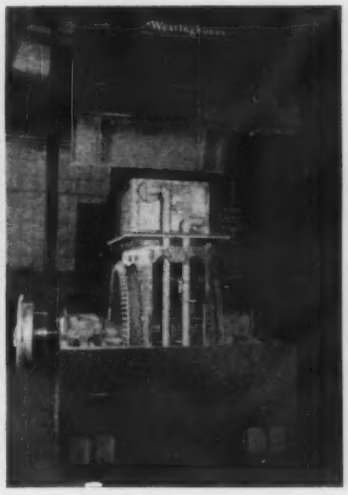
J-15018





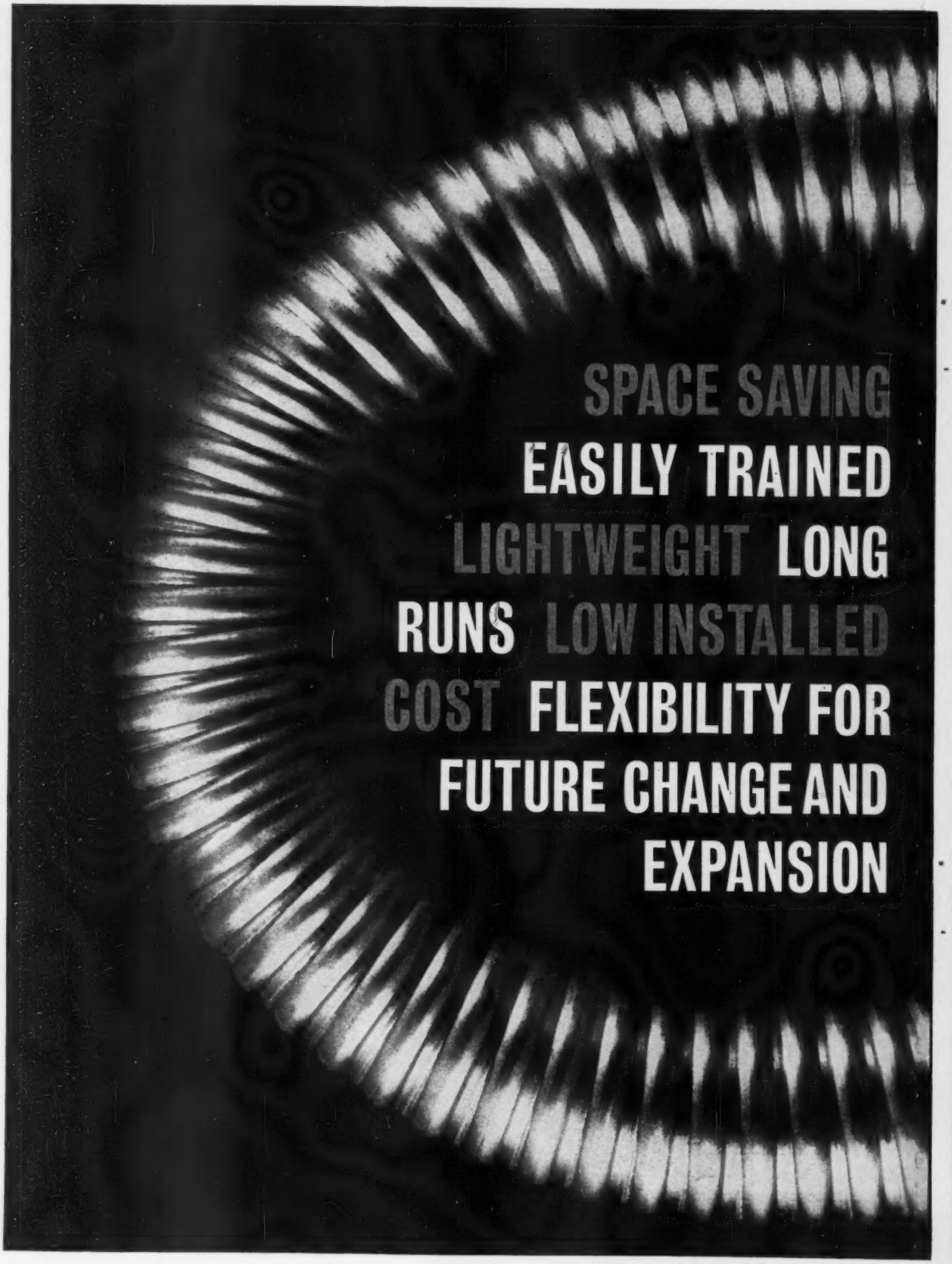
Weather-protected enclosures: At left is the NEMA Type I weather-protected F/A Motor that's perfect for normal outdoor installations.

Right, a NEMA weather-protected Type II F/A Motor enclosure which provides maximum protection where adverse weather conditions prevail.



Enclosure for motors with cooler: Note the cooler is inside the enclosure, which can be quickly taken off to expose the cooler and internal motor components as demonstrated at right. Full accessibility of all F/A Motors means substantial savings on inspection time and dollars.

Westinghouse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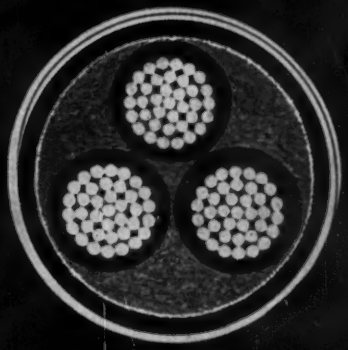

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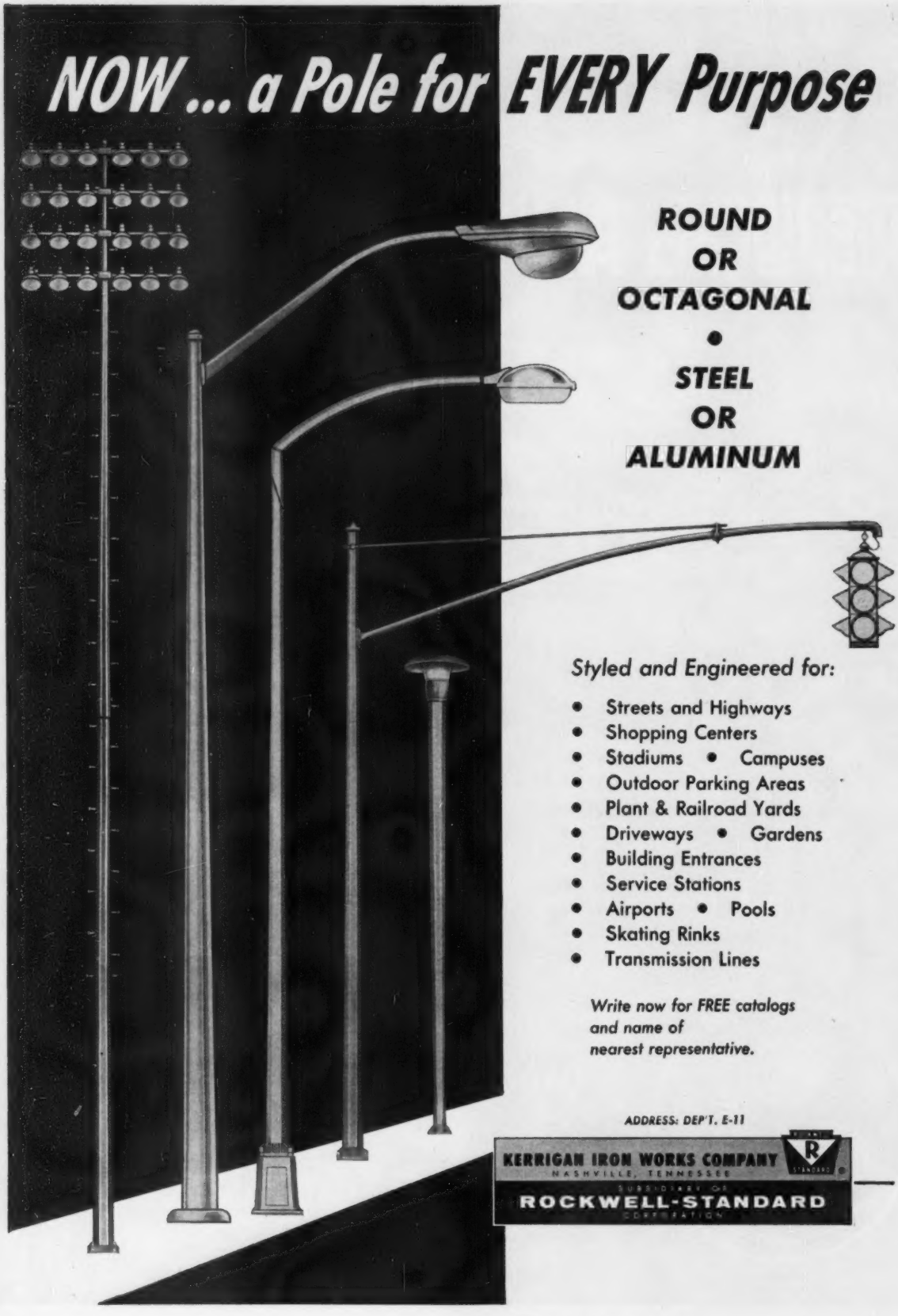

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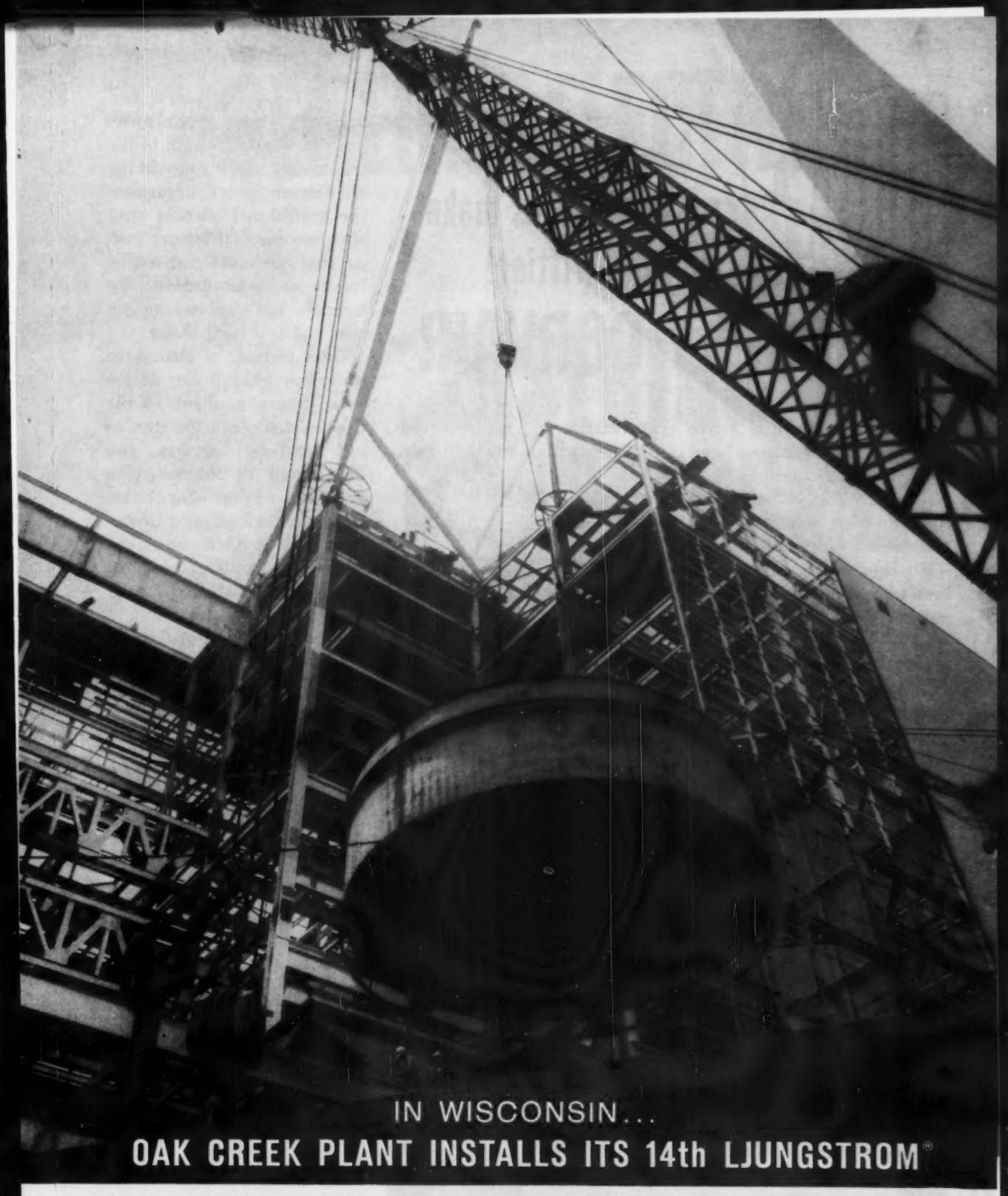

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OAK CREEK PLANT INSTALLS ITS 14th LJUNGSTROM®

Three new Ljungstrom Air Preheaters are being added to the eleven already in service at Wisconsin Electric Power Company's Oak Creek plant. These three 290-ton units will serve the 1,780,000 lb/hr boiler on Oak Creek's #6 unit. The three Ljungstroms, with a total heating surface of 795,300 sq ft, will reduce stack gas temperature from 550°F to about 270°F and preheat incoming combustion air from 190°F to about 510°F.

Our engineers will be glad to recommend how Air Preheater equipment can improve your operating results on new or existing fuel fired units.

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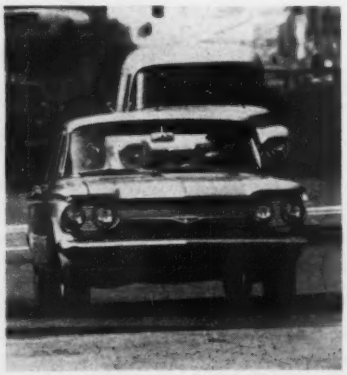
'61 CHEVY CORVAIR

Keeping costs down is a fine art with most businesses—and nobody's more aware of it than Chevrolet. Which is why we've come up with some important news about Corvair for 1961.

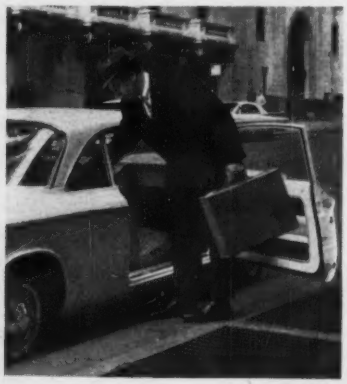
To begin with, prices have been reduced on all coupes and sedans. (Your dealer will be glad to tell you exactly how much.) Enough said.

What's more, a new rear axle ratio, quicker-than-ever cold-start warmup and other improvements help make Corvair a more practical buy than ever.



Under the hood, you'll find nearly 12% more cargo capacity, too. Along with all of the refinements you'll enjoy in the '61 Corvair, you'll appreciate the traditional virtues that have become a trademark with us: that air-cooled rear engine (never needs antifreeze), the traction, the nimble handling that makes driving easier.

Give Corvair a chance to show you what it can do for your balance sheet. Your Chevrolet dealer's the man to see. (And by the way, you might well be interested in Corvair's wagons—the Lakewood and the intriguing Greenbrier. Check them both out while you're getting the short, sweet details about Corvair economy at your dealer's.) . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



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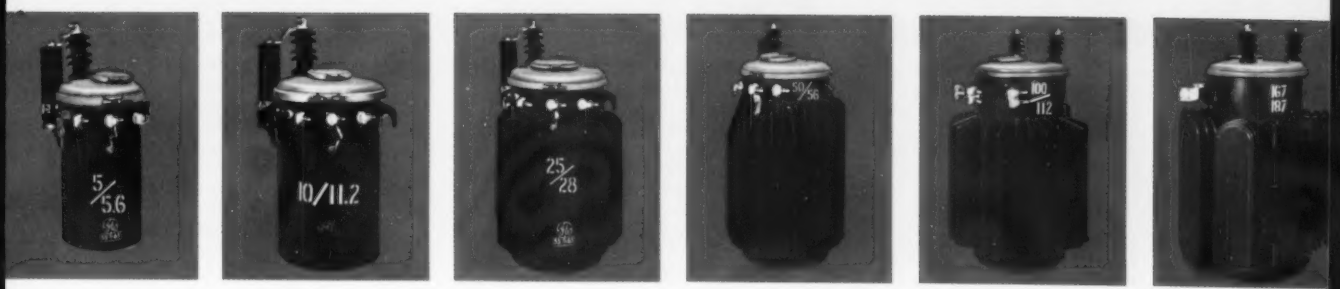
GENERAL ELECTRIC LOWERS DISTRIBUTION TRANSFORMER OWNING COSTS WITH PREFERRED KVA RATINGS



GENERAL ELECTRIC

PREFERRED-KVA RATINGS OFFER . . .

5 ways to lower distribution transformer owning costs

Another significant step toward lower distribution transformer investment and operating costs

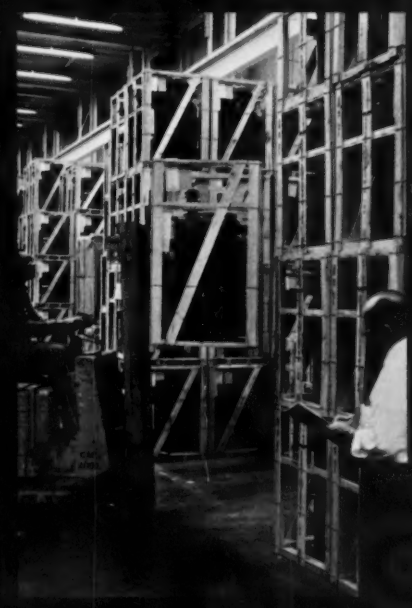
Lower Changeout Cost Use of preferred-kva ratings can lower changeout costs since more load growth can be absorbed. Based on a changeout practice of 150 percent of rating and an annual load growth of six percent, transformer replacement occurs on the average of every 7½ years. With preferred kva ratings, changeout would occur every 12 years, extending the transformer life-on-the-pole 4½ years.

Lower Operating Costs Distribution system operating costs can be lowered by using standard preferred-kva ratings. When preferred-kva ratings are used, the average transformer load is less, lowering total losses. Lower copper losses more than compensate for increased core losses. Also since voltage regulation is related to copper loss, use of General Electric's preferred-kva ratings also means better voltage regulation.

General Electric's preferred-kva distribution transformer program offers you five important ways to lower your total owning costs of distribution transformers. The preferred-kva concept is based on an extensive survey made among representative utilities across the country. The majority of those interviewed preferred standardizing on these **55° ● 65°** transformer ratings: 5/5.6, 10/11.2, 25/28, 50/56, 100/112, and 167/187 kva.

By standardizing on these preferred-kva transformer ratings from General Electric, you can own the highest quality transformers at lower total owning cost than ever before possible.

Before you buy another transformer, let your G.E. Sales Engineer show you how you can lower your distribution transformer owning costs with preferred-kva ratings from General Electric.



Lower Inventory Cost You can reduce your transformer inventory costs by standardizing on preferred-kva ratings. For example, if present maximum stock requirements are 20 15-kva units and 35 25-kva units, a total stock of 55 transformers is required. Standardizing solely on the 25-kva rating, total stock could be lowered to 44 units because of the diversity of need.

Simplified Procedures Standardizing on preferred-kva distribution transformer ratings lowers the cost of such overhead items as ordering, record keeping and financial procedures. Simplifying these procedures plus simplification of transformer application methods helps lower your total owning cost of General Electric distribution transformers even further.

Lower Initial Price In addition to the other factors which contribute to lower distribution transformer owning costs, General Electric recently lowered the initial price of preferred-kva transformers as much as five percent.

This action was taken to reflect manufacturing cost savings which result when utilities support this program by volume purchases of fewer kva ratings.

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Electrical World NOVEMBER 14, 1960

Editorial Comment

Power Strategy: A Post-Election View

The election is over. John Kennedy has been elected President.

With the Democrats assuming executive office, we could get a round of politically inspired changes which slight fiscal responsibility in favor of "the most good for the most people." Surely the investor-owned utilities must be braced for proposals encompassing the full-spectrum federal encroachment spelled out in the Democratic platform.

Proponents of federal power will accelerate their efforts on trusted legislators—and on veterans and newcomers who seem naive or opportunistic enough to accept the gospel. The zealots will continue to press for new federal generation—hydro, thermal, nuclear—dedicated to preference customers, and to perpetuation of the spawn of the union of low interest rates and little or no taxation. They will step up their campaign for wholesale extension of existing federal transmission systems and for formation of new ones in every region.

Each proposal will spell another step in their well calculated plan for a giant *federal* grid to be supplied eventually by a heavy preponderance of federal generation.

What can be done to *defend* against this heightened threat?

We say, *don't defend, attack.*

The federal power threat can be flanked in most areas by incisive action of non-federal utilities led by investor-owned companies.

Such action requires:

1. *Vision* to see that *fully integrated* regional power systems, jointly planned and operated by non-federal component utilities, linked by a giant *non-federal* grid, are not only economically in the public interest; they will make additional federal plants and lines conspicuously superfluous

2. *Enlightened self-interest* to accept loss of a portion of individual *system* sovereignty to achieve maximum economic benefits for all component utilities—and their customers

3. *Intelligence* to find ways of determining expenditures for each member commensurate with its benefits

4. *Courage* to attack and follow through.

Pools and interconnections already exist; they definitely are in the right direction. But *full* integration—the *complete* planning and operation of component utility systems as *one system*—must be extended to its logical economic extreme.

Preliminary joint planning of fully integrated non-federal systems already is in motion in numerous areas across the country. It must not be allowed to lose momentum. Moreover, where municipals, cooperatives and power districts have not yet been invited as partners, this step should be taken. Every persuasion should be used to convince them of the ultimate benefit to their customers.

Such total action does not mean slighting the investor-owned utilities' fact-disseminating programs. Far from it. The federal government has assumed responsibility for power supply in the Tennessee Valley and must be contained there. It may reach for the same status in the Columbia Basin. Here, and elsewhere programs to inform the citizenry continue to be essential.

Yet, overall, aggressive action by non-federal utilities to integrate their systems completely, presents the single best hope of containing the threat of future federal encroachment.

AEC Re-evaluates Safety Information

Indian Point License Expected

Consolidated Edison Co is expected to get an operating license for its 275-Mw Indian Point nuclear powerplant in Westchester County, N. Y., according to the Atomic Energy Commission.

On the basis of re-evaluation by AEC's reactor hazards office of additional safety information provided by Con Ed on the design and characteristics of the proposed reactor, the Commission's staff believes the reactor may now operate in advance of current construction timetables. The pressurized-water reactor, fueled with a mixture of thorium oxide and fully enriched uranium, will provide 163 Mw of the total capacity. An oil-fired superheater will generate the remaining 112 Mw.

Con Ed's reactor hazards summary report was turned down last May by the Commission on grounds that it did not present sufficient data for the AEC technical staff to draw the conclusion that the reactor would safely operate in accordance with design specifications. A satisfactory hazards report, in AEC's determination to grant or deny a reactor full time operational status, is looked on as a key prerequisite.

More Information Requested

Consequently, the utility was notified by AEC that supplemental information or a revised hazards report would have to be submitted before Con Ed can request an operating license hearing date before the Commission.

Harold Price, director of AEC licensing and regulation division, wrote Con Ed that essential technical links in the first safety report's conclusions were simply missing:

"The information presented to date is not sufficient to provide a basic for the safety determination necessary before an operating license can be issued. In general, the report presents conclusions and mentions factors taken into account but does not provide the bases for the conclusions. It will, therefore, be necessary for you to submit extensive supplemental information or a revised report."

The hazards evaluation branch of AEC's reactor development division is now "in the middle" of studying the revised sections of the Con Ed report which, as resubmitted, cover the following reactor components and systems on which Price requested full information: Flux distributions, power distributions, primary system pressure control and pressure relief system, local flux peaking, fuel composition and nuclear burn-up and breeding percentages.

Hearing in January

The rewritten hazards report now places Con Ed in line for a hearing in January for safety approval of only the reactor design. Separate AEC hearings on financial qualifications and reactor start-up and operating procedures would come later. A hearing for actual power operations is planned to coincide with final completion of reactor construction, expected in the summer of 1961.

James F. Fairman, senior vice president of Consolidated Edison, said that Babcock & Wilcox, manufacturer of the nuclear part of the powerplant, assisted Con Ed in preparation and submission of technical information to AEC. Fairman said the Commission's "play-it-by-ear" approach to regulatory proceedings, however, in this instance, led to re-amplification of information which Con Ed had to supply. "Each submission causes another question to be asked, and the record gets to be pretty voluminous," Fairman said.

Westinghouse Gets 'Turnkey' Agreement

Texas Electric Service Co has given Westinghouse Electric Corp a letter of intent covering a prime contract to supply and install all facilities for a third addition to its Handley Generating Station in Fort Worth. The addition will have a rating of 350,000 kw and a capacity of 400,000 kw.

J. B. Thomas, president of TESCO, told *Electrical World* last week that the so-called "turnkey contract" will cover the complete facilities and their installation for the addition from the incoming gas fuel line, including and through the main step-up transformer and associated 138-kv switching equipment. The tandem-compound turbine-generator unit will operate on steam at 2,400 psi—plus 5% overpressure for peaking—and 1,000 F with reheat to 1,000 F. The boiler will be furnished by the Riley Stoker Corp.

Under the agreement the total cost to the utility, including direct expenditures and engineering costs, will be less than $80 per kw based on the 350,000-kw rating of the turbine-generating unit, Thomas said.

Ebasco Services, who are consulting engineers for the Texas power company, have prepared the general specifications for the addition. United Engineers & Constructors will carry out the detailed design as well as the field construction for Westinghouse.

Local purchases of all field materials and the choice of field contractors will be subject to TESCO approval, it was stated.

Hearing Held Without Appalachian

An FPC hearing on Appalachian Power Co's alleged accounting violations has been held and concluded —over the protest, and in the absence of spokesmen for the company. Only testimony placed on the record was that of the FPC staff.

The company had asked for a delay of the FPC hearing until a later date because: **(1)** Appalachian is appealing a related FPC accounting order to the Fourth Circuit Court, and **(2)** a number of Appalachian officials and attorneys were involved simultaneously in a similar case before the Securities & Exchange Commission (involving Kentucky Power Co, also in the same American Electric Power system as Apalachian).

Appalachian also protested the substitution of FPC Examiner Samuel Binder for Chief Examiner Edward Marsh, who first had been assigned to the case. Binder, said Appalachian, wasn't familiar with the reasons for delay, and therefore refused to grant it.

The case—possibly a bellwether for similar FPC accounting complaints against other utilities—had been postponed repeatedly, from Sept. 12 to Oct. 26, before it finally was opened and concluded in a single-day hearing. The Commission had issued similar accounting complaints against ten other utilities during the fall of 1959, but Appalachian has been the only company scheduled for a hearing.

Basic charges against the company are for alleged violations of FPC's accounting categories 507-2 and 266, covering deferred federal income tax accruals. The complaints stem from alleged violation of the Commission's 1958 order (No. 204), revising accounting procedures. Appalachian claims a subsequent FPC order (No. 216) modified the previous order, but FPC Staff Attorney Drexel Journey claims this later order is merely an interpretation of the earlier one.

Appalachian Attorney Chester Davis earlier had called for a delay until the Fourth Circuit Court rules on the relativity of the second FPC order (216) to the case. Otherwise, said Davis, "We (Appalachian) are being asked to defend ourselves against what I might describe as an indictment at the very time we don't know what the indictment is."

Davis said, in a recent letter to the FPC, it would be a "physical impossibility for counsel or the officials of Appalachian to go forward with this hearing" at present. He added that Binder had refused to consider discussions between counsel for the FPC staff and Appalachian on Sept. 19 relative to postponing the case, and that Binder's decision to proceed with the hearing was arbitrary, based on a "lack of familiarity with prior proceedings." Davis said his company would be forced to submit to the proceeding "under protest."

Binder, at the Oct. 26 hearing, commented that earlier "statements back and forth on who did what," involving possible postponement, were "beside the point," and he added that "it is extraordinary that counsel who made the charge is not even here in court, and makes the charge in absentia . . . we cannot try this case by mail."

FPC staff testimony included statements by Gordon F. Heim, Commission accountant, that "Appalachian maintains two sets of basic corporation accounts and records, with different amounts in each set." He said one went to the FPC, the other to stockholders. He added that the company's 1958 net income, as reported in Moody's manual, was not comparable with other years because it was based on a report to the West Virginia Corporation Commission, while prior years' reports were based on reports to the FPC. The 1958 net income, said Heim, was based on "mixed" (FPC and non-FPC) data.

Binder ended the hearing, setting a Nov. 28 deadline for filing main briefs by all parties (including Appalachian), Dec. 19 for filing of reply briefs. He said he would not, could not, open the hearing again for Appalachian's direct case—that would require a petition to, and order from the full Commission.

Nuclear Plant Dedicated

Excavation and steelwork for the containment shell of the first nuclear power plant in the Southeast, at Parr, S. C., drew the attention of visitors Oct. 7 when ground-breaking ceremonies were staged. The nuclear facility, adjacent to Parr steam plant which is being used now for stand-by operation, will have a 19-Mw capacity when completed in 1962. The plant is being built by Carolinas-Virginia Nuclear Power Associates, Inc, consisting of Carolina Power & Light Co, Duke Power Co, South Carolina Electric & Gas Co, and Virginia Electric & Power Co.

Each of these legislators have interest in present and future power legislation

ANDERSON

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Legislators With Power Interest

Sympathetic administration could open the way for revival of several bills that have been tabled in the past

Congress remains firmly under the control of the Democrats, but the election doesn't give them any "mandate" to move for any strong liberal policies on power issues.

The Pacific Northwest, where power issues frequently are the most clear-cut, voted principally along straight party lines, with no tide by the voters to indicate a desire for power policies substantially different from those of the Eisenhower Administration.

The new Democratic Congress might take a look at a number of measures that it has had on hand for several years. During the past eight years, some of these were either keyed down, brought up for study or discussion only, or left untouched because of uncertain administrative acceptance.

Majority Leader Job Open

One of the most significant changes in the Senate will be the naming of a new majority leader, replacing Sen Lyndon Johnson. As vice-president, Johnson will be nominal leader of the Senate, but he will not be able to continue his job as majority leader. Basically, Johnson has been regarded as a more conservative or middle-of-the-road Democrat than much of his party. A less conservative attitude is expected in this post because of the two leading candidates for the job—Sen Mike Mansfield (Mont.) and Sen Mike Monroney (Okla.).

Both Mansfield and Monroney are liberal Democrats, and Mansfield has been a steady voter but not leader for federal and public power legislation. Mansfield is the odds-on choice to be selected which might give the Pacific Northwest a strong voice in power policies.

There were no changes in leadership of the Public Works Commitees of either the House or Senate. Rep Charles A. Buckly returns as chairman of the House committee and Sen Dennis Chavez remains as head of the Senate committee.

Republicans Make Gain

Both the Senate and House of Representatives will show a small increase in the number of Republicans in January, but the preponderance of Democratic members will continue.

Most of the incumbents running in both parties won re-election, including those associated with power issues—either private or public.

Sen Clinton Anderson (D-N.M.) strong pro-federal power chairman of the Joint Atomic Energy Commission was re-elected. He will turn the chairmanship over to liberal Rep Chet Holifield of California, but remain vice chairman. This is merely routine because the chairmanship changes every two years. Anderson will become chairman of the Senate Interior Committee. Sen Robert S. Kerr (D-Okla.), chairman of the Select Committee on Water Resources, had more trouble than in previous campaigns, but most of this was attributed to an intra-state political squabble between him and Democratic Gov J. Howard Edmondson.

Issues apparently didn't play a major role in the 1960 elections. It was mostly a battle between the Democratic and Republican parties—and there were more Democrats in the big, key, industrial states.

Kennedy's strong stand for greater federal reclamation and power development in the Western states had little effect on the voters, as most Republican and conservative members of the Senate and House were re-elected, while several liberal Democrats went down to defeat.

Strong personalities in both parties kept their seats, however.

The House of Representatives will remain under the control of Speaker Sam Rayburn, House Rules Committee Chairman Howard Smith (D-Va.), and Minority Leader

These candidates fought tough but winning battles to retain their seats

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Records Returned to Their Posts

Charles Halleck (R-Ind.).

Most House committee chairmanships stayed unchanged as a result of the election. Democratic chairmen re-elected were: Wayne Aspinall (Colo.), House Interior; Wilbur Mills (Ark.), Ways & Means; Oren Harris (Ark.), House Commerce; Walter Rogers (Tex.), House Interior Subcommittee on Reclamation:

Other House Democrats re-elected were James Trimble (Ark.), sponsor of the "Trimble Bill" to reallocate costs at federal multi-purpose projects more favorably for power development; Gracie Pfost (Ida.), supporter of the controversial federal Burns Creek power project.

Mrs Maurine Neuberger (D-Ore.), won the Senate seat held by her late husband, Richard Neuberger, in a battle of personalities with former GOP Gov Elmo Smith. Mrs. Neuberger is expected to carry on the federal power policies of her husband. She has been a strong supporter of legislation to turn the Bonneville Power Administration into a federal "valley type" power marketing corporation with authority to issue its own revenue bonds.

In Wyoming, GOP Rep Keith Thomson beat Democrat Raymond Whitaker for the Senate seat being vacated by Democrat Joseph O'Mahoney. Thomson is classed as a middle-roader.

Metcalf Wins Close Race

Montana voters gave a razor thin edge to Democratic Rep Lee Metcalf over former Republican Rep Orvin Fjare for the state's Senate seat being vacated by Sen James Murray, long-time Democratic chairman of the Senate Interior Committee. Metcalf, a liberal Democrat, had been expected to win by a far bigger margin. Metcalf is known as author of an upstream benefits bill carrying his name. It died in the last session of Congress.

Colorado voters returned Republican Rep Edgar Chenoweth in a close race, and defeated liberal Democrat Byron Johnson. Chenoweth has been a long-time champion of the proposed federal Fryingpan-Arkansas water diversion and power project.

Other Republican winners associated with power issues are liberal Sen John Sherman Cooper (Ky.), a supporter of TVA; Sen Karl Mundt (S.D.), in a close race with Democratic Gov George McGovern (McGovern was supported strongly by state rural electric co-op leaders); Sen Henry Dworshak (Ida.); Sen Gordon Allott (Colo.); Sen Carl Curtis (Neb.) conservative Rep John Saylor (Pa.), and minority leader of the House Interior Committee; Rep Ancher Nelsen (Minn.) former REA administrator; Rep Edgar Hiestand (Calif.), who is the sponsor of bills to raise REA interest rates; and arch-conservative Rep Ben Jensen (Ia).

KERR

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Youth Conference on the Atom . . .

Big Moment for Science Students

Inspiration seemed to crackle in the atmosphere of Chicago's Museum of Science & Industry as some 250 brilliant high school students fired questions at 20 of the nation's foremost scientists and business men. The occasion was the second annual Youth Conference on the Atom which is sponsored by 64 electric utilities.

The students heard Dr Robert E. Wilson of the Atomic Energy Commission call for resumption of nuclear weapons testing. They heard Dr Lowell T. Coggeshall, vice president, medical affairs of the University of Chicago point out the importance of getting liberal arts education as necessary background for the scientists of the future. And Dr Norman Hilberry, director, Argonne National Laboratory, threw out to them the great challenge that is in the things that are still unknown in science.

The students in turn, with their amazingly sophisticated questions, traded back to their mentors reassurance that the nation's scientific future will be in capable hands.

Interviews with a sizable cross section of the students revealed that they were almost unanimously impressed by the opportunity to talk with the men who are solving today's scientific mysteries. Most repeated comment was to the effect that the lectures and discussion sessions helped the students see the relationships of the various basic sciences to each other. They indicated that they came to the conference with perhaps a single or limited interest—and left with a broad concept of the world of science.

While the scientific interests of the students ran the gamut from mathematics to biology, there were some outstanding similarities. Nearly all were "A" students, were dependent on scholarships for their higher education, and most had already gone more than halfway toward deciding exactly what their careers would be. It was evident, however, that the broader scope of science that they were exposed to was being used to orient themselves and their individual talents and interests with a scientific world that is probably somewhat greater than they had realized.

Impressive to teachers, speakers, and discussion leaders was the obvious hunger for specific facts. In a survey of 52 students conducted by Bozell & Jacobs, the most repeated criticism was that more and longer discussion sessions should be held. It was in these sessions that the students had their best opportunity to pick the top scientific brains of the nation, and they did so with intensity and intelligence. The unclear answer was taboo, and there was little hesitation in challenging the opinions or theories of either discussion leaders or each other.

In general, the students were grateful to the sponsoring utility company that made it possible for them to be on the scene. Few, however, identified their own career plans with utility employment, because their own interests seemed to be in the field of basic science rather than the engineering careers they associated with the utilities. There was no question that the electric utilities scored solid public relations points.

The teachers were obviously proud of their charges, some of whom had won stiff competitions for the privilege of attending. Several of the teachers indicated they had plans for the students to carry their experience back to classmates, and expressed hope that this would stimulate others to consider scientific careers, or to try for higher achievements in science courses.

The Museum of Science & Industry itself was fascinating to the students, but they had little time to explore it—another complaint frequently registered in the survey.

Airport Hazard Ruling Coming Soon

The Federal Aviation Agency will issue a new regulation soon governing the heights of structures—including power lines and radio-tv towers—that migh constitute hazards to air safety.

The Agency notified building, broadcasting and power interests in September of plans to broaden the current regulations. It is now reviewing these comments and contemplating whether to modify the new rules before putting them into effect.

The FAA originally proposed that it be given advance notice any time plans are made to erect a structure anywhere exceeding 150 ft in height. The same requirement would apply to existing structures whose heights are to be raised beyond 150 ft by alteration.

Notice also would be required for structures of lesser heights within 15,000 ft of an airport. In this case, the height would be determined by a ratio of one foot to each 100 ft of distance from the boundary of a landing area.

In other words, anything higher than one foot at 100 ft, 50 ft at 5,000; 100 ft at 10,000, and 150 ft at the outer periphery of this area and beyond would require the filing of a notice with FAA.

Structures of still lower heights would be affected if they are within the approach patterns of airport runways 2,000 ft or longer.

Once FAA is notified of plans to erect structures exceeding these heights, it would then determine whether they might constitute hazards to aircraft.

If the Agency decided the structure would not be a hazard, even though it is higher than the basic minimum, it would notify the builder to that effect. If it felt a hazard would exist, it would tell the builder why it reached this conclusion.

News Scope

BRIBE CASE—Prime contractor on Priest Rapids Dam has been given a $660,000 suspended fine after pleading guilty to six of nine counts of a bribery indictment. The fine was suspended on condition the contractor, Merritt-Chapman & Scott Corp of New York, pay $50,000 into the Grant County, Wash., current expense fund, to help pay for the grand jury investigation that led to the indictments. The contractor bribed the former manager of county PUD, which is building the dam.

TROUBLE SPOT—The purpose of test runs of new steam generating stations was pointed up in northern Alabama recently. When a 500-Mw unit at Widows Creek station of the Tennessee Valley Authority was under test, friction in a boiler feed pump developed, caused an oil leak, which in turn was ignited by the extreme heat. Controls for both of the feed pumps were damaged, and the unit is down until repairs are made.

GO-AHEAD — Installed capacity recommendations for proposed Wells Dam on the Columbia River have been upped from 414 Mw to 560 Mw. Bechtel Corp studies indicate that the Douglas County PUD dam can be built to a greater height than originally planned. Projects such as Wells should go ahead despite the pending US-Canada treaty for development upstream of the Columbia, Howard Elmore, assistant manager of the Chelan County PUD, said in a recent speech.

FOR SALE—Preliminary bargaining is underway for sale of American Foreign Power Co subsidiary, Compania Colombiana de Electricidad, to the Columbian government. Denied rate increases, the utility has had to suspend its construction program and was unable to meet full interest obligations in 1959.

TAX PRIVILEGES — Washington legislature can exempt private utilities from property taxes if its purpose is ultimate equalization of the tax structure, State Attorney General John J. O'Connell has told a council studying utility taxes with a view toward recommending future legislation. The exemption, politically unlikely, would not be discriminatory if a privilege tax were levied on utilities at same time.

Dateline . . . Washington, D. C. (*Continued from page 5*)

path of the High Mountain Sheep application. PNP may be able to hurdle every one of them, but this will take some high-stepping. For example:

• Delay is one of the key problems for PNP. One of the company's strongest talking points now is that High Mountain Sheep could be built at once across the Snake River, while research continues on adequate fish facilities for a high dam across the fish-loaded Salmon River (where either WPPSS' Nez Perce dam or PNP's future Lower Canyon dam would be built). The longer High Mountain Sheep is delayed, the closer Nez Perce fish facilities can come toward development.

Nez Perce attorneys are seeking, from the full Commission, a delay of the hearings until next year after being turned down by FPC Examiner Levy. WPPSS attorney Evelyn Cooper states she will take "every procedural step necessary" to win the case for Nez Perce.

Interior Secretary Fred Seaton reportedly is preparing a letter to FPC Chairman Jerome Kuykendall pointing out that the FPC needn't be "pressured" into granting either project license, if necessary, because of the anticipated nearly 1.7 million kw of prime power that would be added to US capacity in the Pacific Northwest as a result of the proposed US-Canadian development of the Columbia River. In addition to Seaton, both President Eisenhower and Interior Undersecretary Elmer Bennett have mentioned this same theme to a lesser degree. WPPSS attorneys argued strongly, in a prehearing conference, that the proposed Columbia development would be a possible alternative for immediate power needs from High Mountain Sheep.

• Federal intervention in the issue is possible. This would follow the same format as the Hells Canyon battle, where the FPC had one license application while Congress considered a rival plan.

A federal High Mountain Sheep project would seem more possible under a new Democratic administration, where the chance of a presidential veto would be less likely. President Designate John Kennedy has gone on record in favor of more new multi-purpose starts.

• Charges by WPPSS attorneys of bias and prejudice in favor of the PNP plan on the part of some FPC staff members will be emphasized. These charges, turned down by Examiner Levy, are being appealed by WPPSS to the full Commission and could go to court at a future date.

WPPSS also is petitioning to subpoena records of Pacific Northwest Power to examine and determine, under Section 10 (H) of the FPC Act, whether the company is an organization in violation of the Commission's antitrust regulations. Mrs Cooper has questioned PNP's financing status before the Securities & Exchange Commission.

Under a Kennedy Administration, federal project would be more likely as an alternative to private development of High Mountain Sheep.

Needed: A Steam-Turbine Unit

Problems in dispatching peak and light loads show need for unit with wide load range and low average annual heat rate

M. C. **WESTRATE**, Chief System Engineer, Commonwealth Associates, Inc, Jackson, Mich

Large steam electric generating units are still the most economical way to supply the energy for most large electric utility systems. However, the desire to achieve maximum efficiency in the early years of operation has resulted in many units being designed for maximum efficiency at or near their maximum capability. When units of this type become a major percentage of the power supply they present a problem in dispatching generation to satisfy both peak load and light load conditions.

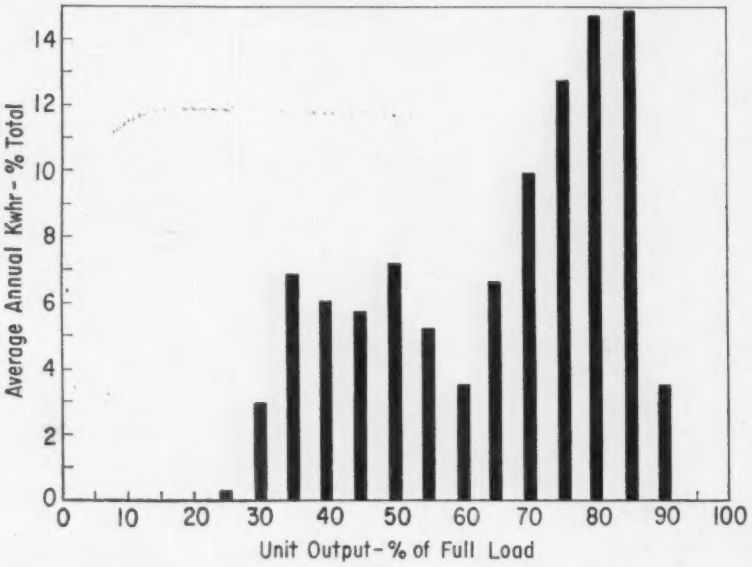


FIG 1—WEIGHTING CHART computed from weekly load curves for the entire year, helps evaluate relative worth of efficiency at various generator loadings

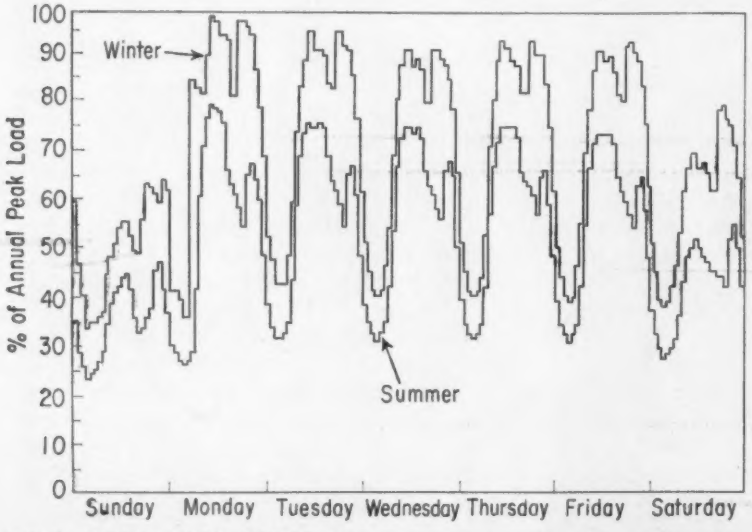


FIG 2—WEEKLY LOAD CURVES point up importance of sustained generator efficiency under various conditions of loading on modern power systems

Many types of units have been considered for use to supply peaking capacity but a number of studies by Commonwealth Associates have indicated that combinations of steam electric base load units with separate peaking units are not economically attractive on large systems. Therefore, the conclusion is that greater effort should be directed toward developing steam electric generating units which are better adapted to supply the system load cycling requirements (see EW, Nov. 7, 1960, p 88).

This conclusion leads, in turn, to the need for a method of evaluating turbine heat rates and plant costs to give optimum economy on an annual basis. Such an annual evaluation can be of greater significance and provide better overall results than can be obtained with a minimum heat rate at peak load.

Four Basic Requirements

The criteria for designing a steam electric generating station to fit all system loads has four basic aspects. The units including turbine, generator, boiler and auxiliaries: **(1)** Must operate satisfactorily with regard to stability and efficiency at low output; **(2)** Should have an extra margin of capability for supplying needed spinning reserve to provide for unexpected load increases or loss of other generating units; **(3)** Should be capable of frequent startups and shutdowns without undue maintenance; and **(4)** Should have as low an average annual heat rate as is justified by the investment that is required to give the lowest total annual cost.

If a steam electric generating unit were designed to meet all of these objectives, then it could serve either as a base load unit or as a peaking unit as the occasion required. Moreover, it might be expected to have a longer useful service life with less probability of obsolescence than units designed

for Cycling

exclusively for either base load or peak load operation. Thus there is a need for specific design criteria for steam electric generating units to meet general requirements other than a minimum heat rate at peak load.

With the current trend toward diminishing improvement in the efficiency of steam-electric generating units, it seems reasonable to assume that a large unit installed today as part of a system supplied predominantly by large reheat units will, on the average, operate throughout its life at loads that will vary with the system load curve. Actual loading would be based on incremental costs and on economic dispatch. The design criteria depend on the relative worth of efficiency at various generator loadings as determined by the number of kilowatthours that are to be generated at that specific loading.

Weighting Factor Developed

A weighting factor chart, Fig 1, can be computed from a study of weekly load curves, Fig 2, for an entire year. As used in this example, the units are expected to be dispatched for 10% spinning reserve at the time of the weekly peak. Units not required to meet the weekly peak may be considered to be available for scheduled maintenance.

Whether daily or weekly load curves are used for evaluation depends on whether units are started and stopped daily. Weekly curves are used in this example on the assumption that units will not be started daily.

Annual load duration curves are not adequate for determining unit loadings because they do not recognize spinning reserve or units out for maintenance. Annual load duration curves may be very misleading in determining peaking capacity operating economics. Average unit loadings can only be determined by knowing the proper dispatch for any system load and the number of units in operation is determined by the peak daily or weekly load. Peak load problems can occur nearly every week in the year when units are scheduled out for maintenance on the basis of minimum reserve requirements.

Consider Light Load Periods

It may be expected that, during the life of any unit, there will be times when it will be desirable to operate at loads of 20% of its peak rating, or perhaps less, to avoid shutdown for periods of a few hours, or for operation to provide area protection. Light load on many systems is in the order of 35% of peak load over a weekly cycle on the

(*Continued on page* 122)

Table 1—Investment Data

Basis of Estimate, Two-Unit Plant,
New Site Less Engineering, Supervision, Overheads,
Site and Site Development at 3½-In. Hg Back Pressure

Method of Extended Ratings	Unit Mw Rating Base/Peak	Unit Cost $/Kw	Unit Net Heat Rate Btu/Kwhr Base Rating	Peak Rating	Avg Annual
Conventional 8FW Htrs TC4F Unit...	315	128.00	9,165	.....	9,413
By-Pass Top Two Heaters TC4F Unit	280/315	121.00	9,148	9,387	9,346
By-Pass HP Turbine TC4F.....	268/315	128.00	9,140	9,820	9,323

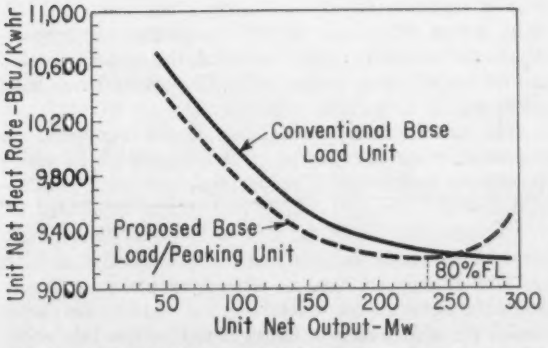


FIG 3—ANNUAL HEAT RATE for unit designed to carry portion of all system loads will be lower than annual heat rate for base load unit

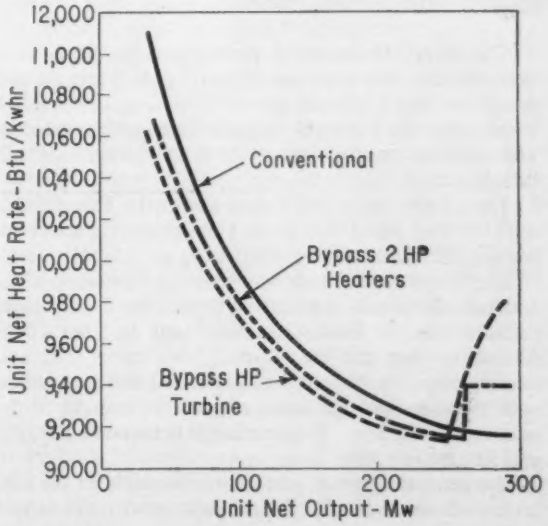
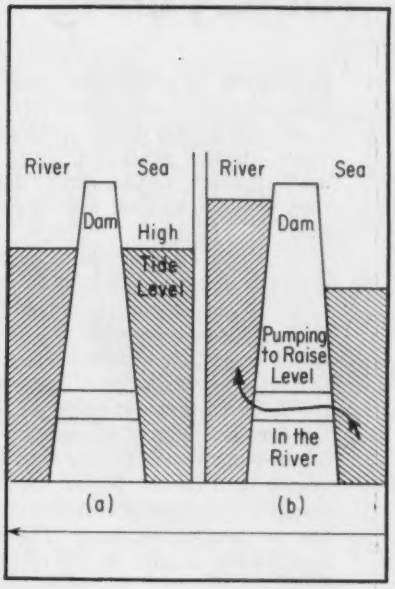


FIG 4—POSSIBILITIES for universal unit design are pointed up by comparison of heat rate curves for a conventional unit and units having portions of turbine cycle by-passed

Photo by France Actuelle



RANCE ESTUARY site of tidal dam being built by Electricite de France

French Rance Plan to Generate

Reversible hydro scheme replaces plan for nuclear plant in Brittany; proves economical

J. H. M. SYKES, Overseas Correspondent-Engineering, Electrical World, Bedford, England

The River Rance tidal power scheme, now under construction, has replaced Electricité de France's proposal to build a nuclear power station in Brittany. It is expected to have the longest generation period of any tidal scheme to date, 4 to 6 hr during each 12-hr tide period.

The scheme envisions a dam across the River Rance 2,513 ft long and 157 ft wide. Height of crest above the highest tide level will be 4.92 ft.

The River Rance area was selected because the rise and fall of the tide are greater there than in any other suitable area of France. Tidal range is from 10 to 43.5 ft, varying with the season. The flow of the river, varying between 17 and 4,247 cfs, is small in contrast with the enormous exchange of water in and out of the estuary at each tide. This exchange is between 141,000 and 529,000 cu ft.

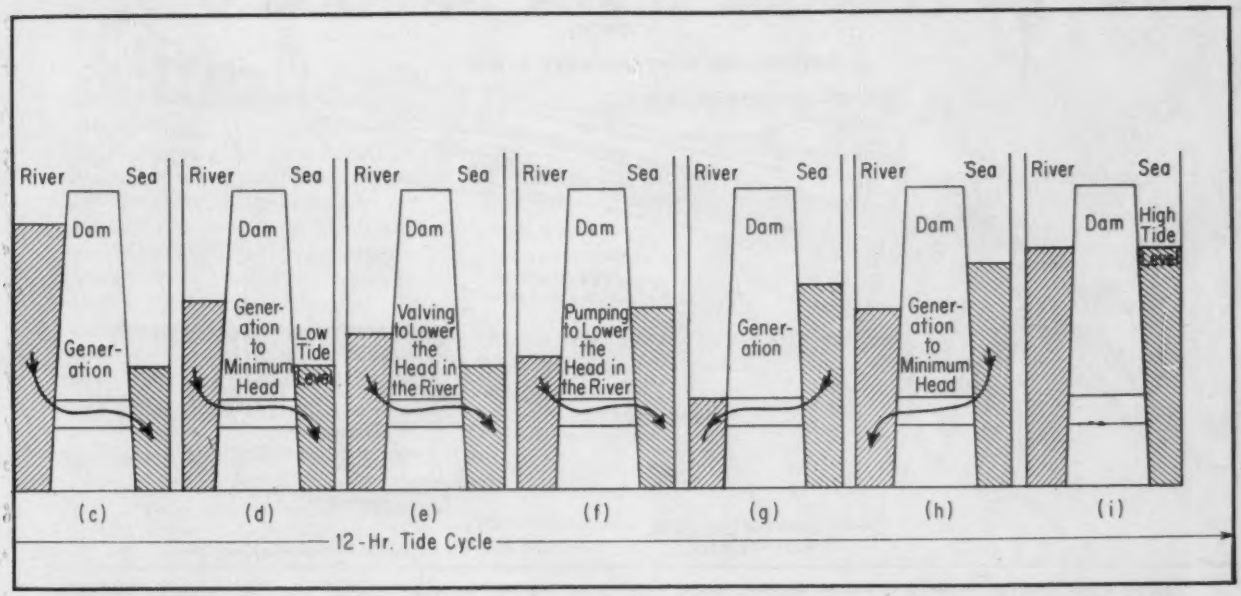
The generating units, one of which has been on trial in the harbor of St. Malo, are totally-submerged upstream bulb-type units. Plans call for placing 24 of these, each of 10-Mw capacity, in orifices through the dam. Running at 93.75 rpm, they will operate under a slight internal air pressure of 14 psi above atmosphere.

The turbines, having feathering blades with a 17-ft, 6-in. swept circle, can be used as pumps or turbines. When the blades are fully feathered, the orifices operate as valves, allowing a flow of 6,356 cfs under a head of 39 in.

The scheme's improved generation will depend on the availability of other plant in the network in which it will be connected. The principle involved is illustrated.

Assume first as in (a) that it is high tide and the water level inside the dam, on the river side, is as high as that of the sea outside. By using pumping power from the network the river level can rapidly be raised above the sea, which is falling away as the tide ebbs. Generation begins (c) when the minimum head of about 17 ft is available.

In the fifth phase, labeled (d), generation proceeds until the minimum head condition is reached and tide outside the dam is low. When the turbine blades are feathered and turned into valves, the inside water level can be lowered rapidly. Once the two levels are



CYCLIC EFFECT of tide is illustrated in connection with generation at River Rance power scheme. In (a) the tide and river flow are in equilibrium. In (b) the flow is from the channel, generators operating as pumps. The latter action is reversed in (c) when the inside head is greater. In (f) pumping operation is again reversed

Using Both Tide, River Flow

in equilibrium, pumping power can be applied again to bring an artificially low level inside the dam. Meanwhile the outside tidal level is rising.

Before long, as at (g), generation becomes possible again, this time with the water flowing in the reverse direction to the flow in the first generation period. Generation continues until the rise in water level inside the dam brings minimum head conditions as at (h). At (i) the cycle, which has taken 12 hr, recommences.

Thus the project achieves a much greater generating output than any project heretofore proposed. When completed, the project is expected to save on the use of coal at thermal stations in the network, the economy, it has been stated, being equivalent to 1,000 million kwhr per year.

The scheme is flexible in the extreme. Although the high and low tide periods will vary each day with the tidal cycle, varying the amount of pumping power and the time at which it is received will enable the scheduling of generation at almost any state of the tide. When peak power is needed, it can be provided in most instances; and, when the need is for base load power, a different program will make very large quantities of base load power available.

In addition, the pumping power can be used to improve the efficiency of thermal plants.

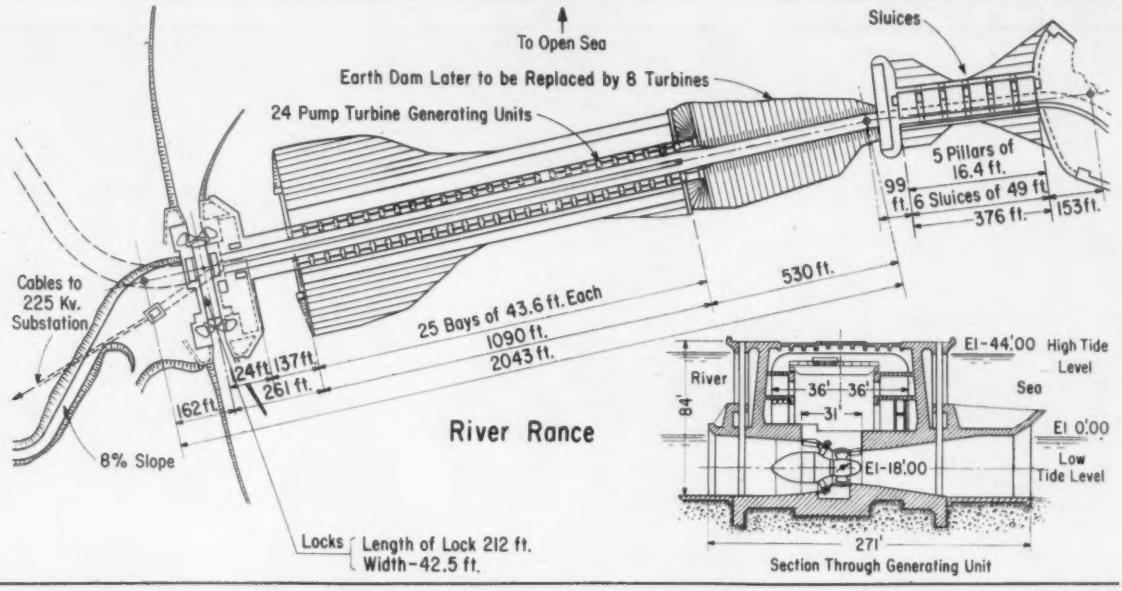
The dam will be in hollow form of reinforced concrete and will have six sluice valves. On the right bank, a lock will permit boats to pass up the River Rance.

Cost of the project has been estimated at about $98 million, and it is expected to take between four and five years to complete the dam. The equipment will be installed in stages after that period.

This writer has closely observed the very detailed model which has been in operation for several years at St. Malo. This model has enabled the French engineers to estimate exactly how the siting of a dam across this river will affect the erosion of the coastline and the possible silting of the harbor and other navigable waters. This model, extending over an acre, was built to a scale of 1/150 in the St. Malo dockyard. Tides were simulated so that a complete tidal cycle took place in 12 min.

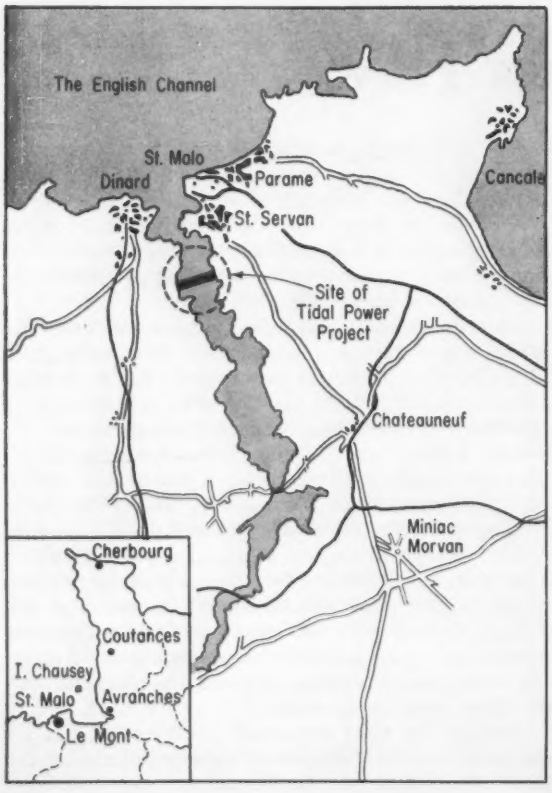
The water used carried with it fine particles which simulated the behavior of the very considerable amount of gravel and suspended matter in the waters of the Rance. Operation of this model for, say, a thousand tides, enabled the engineers to assess the building-up effect of dams at various sites and the characteristics of various dam configurations.

Perhaps the most important work carried out on the model was the evolution of a method of closing the dam. It is expected that when the dam has been



RIVER RANCE TIDAL POWER SCHEME, already under construction by Electricite de France in Brittany, will use both the tide and the river flow for the generation of power. It is expected to have the longest generation period of any tidal scheme to date. Power from the network enables the 24 generating units to operate as pumps to create head when the tide in the English Channel is low or out. The plan shows the dam scheme connected to the network

DAM PROJECT, replacing nuclear plant in French planning, is on River Rance which empties into channel at St. Malo



advanced from both banks to where only a narrow gap remains, the very swift tidal flow will cause considerable difficulties. There are 14-day periods in the year when the tides are at their lowest. Model closing operations were carried out so as to complete the closing in such a period. This entailed the handling of very much material.

As a result of these tests, arrangements have been made for belt conveyors on the actual project. During the closing, the belt conveyors will handle some 6,000 tons of rock material every day.

Calculations show that proper employment of the Rance tidal project will cut the cost of a kwhr generated in a thermal station at a particular time in relation to the daily load curve. Thus tidal power, whatever the relationship of the capital costs of equipment to those of thermal stations, at the same rate of interest on capital, can be economic when properly integrated into the system.

The installed plant at 240 Mw will give an annual production of 567.5 million kwhr after deduction of pumping power. By adjustment of the pumping times and borrowed power, guaranteed peak output during the 1,200 peak hours in December, January, and February is 96.8 Mw. This output can be achieved at any state of the peak-hour tide.

The economics of this scheme, however, cannot be measured by ordinary yardsticks. Although more costly per kw of firm power in terms of capital cost than a hydro station, the project's output characteristics can only be evaluated in the light of the improved efficiency it can bring to neighboring thermal and more distant hydro installations in the network. The French are convinced that the scheme is worthwhile.

See 8,000-Mw Atom Capacity by '66

Vienna, Austria (*McGraw-Hill World News*)—Atomic power is becoming a factor first in highly industrial countries rather than in the less developed countries. This finding provided the thread through the four-day Conference on Small and Medium Power Reactors held by the International Atomic Energy Agency (IAEA) in Vienna.

Hubert de Laboulaye, deputy director general of the IAEA for technical operations, told delegates that highly industrial lands are the most promising for this development as these countries **(1)** can be expected to possess an industry able to produce a large part or all the equipment and materials needed and, **(2)** have economic conditions that favor consumption of the energy produced.

Fifty-five experts from 12 countries lectured the assembled 260 delegates from 40 lands. But it was the delegates of the highly industrialized countries who showed active interest—in giving information as well as taking in what others said.

Agency Is Three Years Old

Sterling Cole, former US Congressman now serving the last of his four years as the Agency's first director general, pointed out that less developed countries are trying to jump over centuries of evolutionary development by demanding power reactors as a starting energy source and disregarding local fossil fuel. This pressure, he said, and the overly optimistic outlook on nuclear power has led to disappointment and a cutback in the short-term nuclear power programs, although long-range plans remain unchanged. Despite the erratic oscillations of technical and economic development, the outlook for nuclear power reactors today is toward greater optimism.

Cole predicted that atomic power capacity in 1966 will be about 8,000 Mw, based on long-range plans known to date. Present nuclear capacity amounts to about 1,000 Mw in four countries. Plans have been announced for 28 plants with additional capacity of 4.5 thousand Mw. Current construction will add both Germanies, Canada, Japan and Czechoslovakia to the list as near-future nuclear power countries, with Brazil and India coming next as the first of the underdeveloped lands.

Noting the prevalence of small electric systems in the world, de Laboulaye told the delegates that "out of 50 member countries in Asia, Latin America, Africa and the Middle East, in 1960 only seven or eight have an installed capacity of over 1,000 Mw, and these countries have a capacity not exceeding 200 to 300 Mw per distribution network. Even in the US, 1,200 utilities out of about 3,200 have less than 200 Mw per distribution network." These facts clearly point at the employment of small (to 10-Mw) and medium (to 100-Mw) reactors rather than to superlarge stations, he concluded.

Advanced Types Not Included

Speakers stressed that it would be pointless to bring reactors like the fast breeders or homogeneous types into current calculations because of their too-advanced technologies. The IAEA considers in its plans only types already in operation or about to be operated on a commercial scale: pressurized-water, boiling-water, gas-cooled, organic-moderated and D_2O reactors.

The conference brought out the difficulty of establishing reactor-plant costs in different countries and different generating systems. Reasonable approximations, probably as accurate as most of the information they are based on, were held possible. Nuclear power costs expressed in mills per kwhr were regarded as having only limited value because of their dependence on local conditions, such as financing. So, in evaluating the economy of a nuclear plant, the IAEA will break down the cost into these three parts, all in dollars per kw of capacity:

- Initial investment, including the fixed cost on capital and the initial fuel charge;
- Cost of replacement fuel, including transportation, insurance and handling, minus credit for spent fuel; and
- Annual operating and maintenance charges, with consideration of the possible need for foreign specialists, the local lack of skills and equipment and lack of repair facilities, and the transportation costs of such special materials as heavy water and helium.

Wide differences have been found in these costs in various countries (see table). Compared with the US, the cost of financing in other nations is higher, of construction and operation, lower.

Comparative Nuclear Costs by Country

Reactor Type	Output, Mw	Initial Cost, Plant Only $/Kw	Fuel Fabrication $/Kw	Operation and Maintenance $/Kw
United States:				
Pressurized-water	75	435	145	9.6
Boiling-water	75	470	100	9.7
Organic-moderated	75	350	130	13.1
Heavy-water	75	640	31	12.7
Gas-cooled	75	675	88	9.7
United Kingdom:				
Gas-cooled No. 1	50	700	45-60	NA
Gas-cooled No. 2	60	335	45	NA
Pressurized-water	60	335	NA	NA
Canada:				
Organic-cooled	55	435	17	NA
West Germany:				
Heavy-water	49	400	40	NA
Gas-cooled	35	485	13	NA

NA—Costs not available

Determine Open-Delta Duplex-Transformer

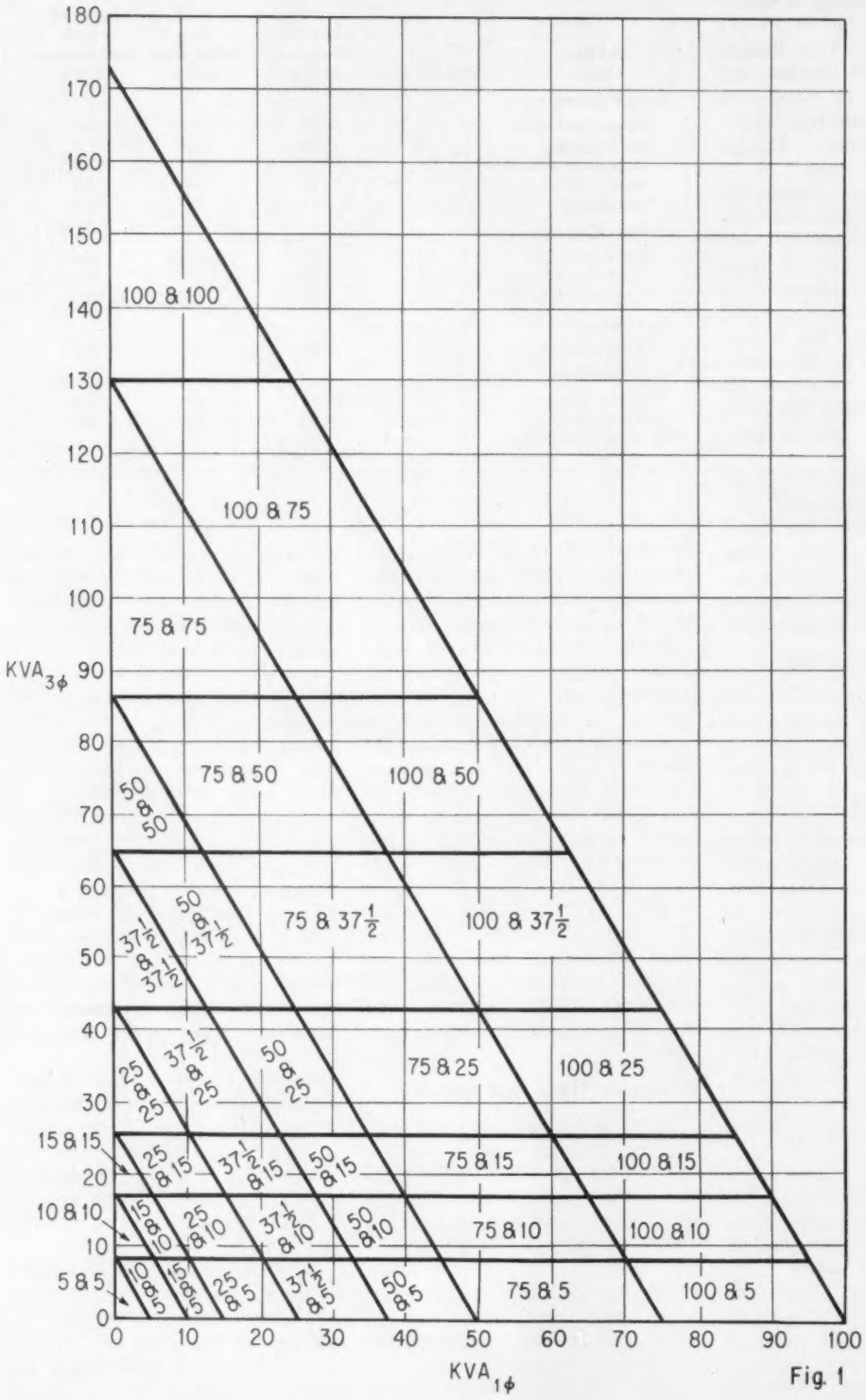


Fig. 1

Loading Graphically

FRED A. HATFIELD, Design Engineer, Line Material Industries, Milwaukee, Wis.

Simultaneous single and 3-phase loads on 3-phase, open-delta connected duplex transformers can be determined graphically by using curves derived from the net current flow in each transformer from both single and 3-phase loads. A graphical tabulation of transformer sizes required for various loads is given in Fig 1. Standard transformer sizes are represented by the areas enclosed by bold lines.

When balanced loads are known, the area in which the load ratings intersect is the safe transformer size. For example, if the single-phase kva is 40 and the 3-phase kva is 80, the transformer sizes would be 100 kva and 50 kva.

When transformer sizes are known, the loads intersecting within the desired area are permissible. For example, if the transformer sizes are 100 kva and 75 kva, permissible load ratings range from 50 kva single-phase and 87 kva 3-phase to 25 kva single-phase and 130 kva 3-phase.

If the single-phase load is unbalanced, Fig 1 can be used the same as for balanced loads after the total kva of single-phase load has been calculated. This total kva of single-phase load is based upon the larger unbalanced load component. For example, if the unbalanced single-phase load is two unbalanced 120-v loads in parallel with a 240-v load, single-phase kva would be determined as follows:

Single-phase kva = (larger 120-v load × 2) plus 240-v load

Load changes of leading and lagging connections result as shown in Figs 2 and 3 when the single and 3-phase loads are of different power factors. When connected in the leading phase, the larger transformer becomes more heavily loaded as the difference in the power factor angle of the loads increases. At a power factor angle difference of 20 deg the larger transformer is carrying more load than when the power factors are the same.

When connected in the lagging phase, the larger transformer becomes more heavily loaded as the difference in the power factor angle of the load decreases. At a power factor angle difference of 20 deg the larger transformer is carrying less load than if the power factors were the same.

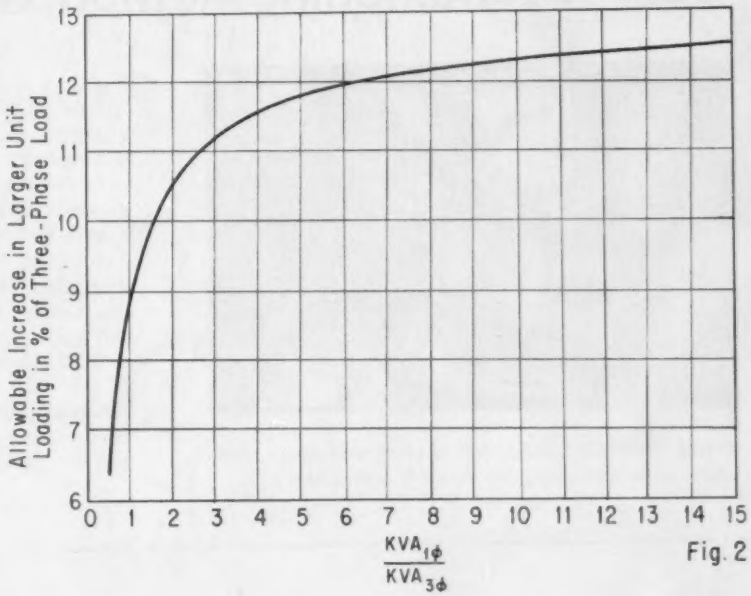


Fig. 2

PERMISSIBLE ADDITIONAL LOAD on the larger unit, due to 20-deg difference in phase angles of the single and 3-phase loads is shown by curve in terms of percent of 3-phase load. Curve is based on connection of the larger transformer in the lagging phase

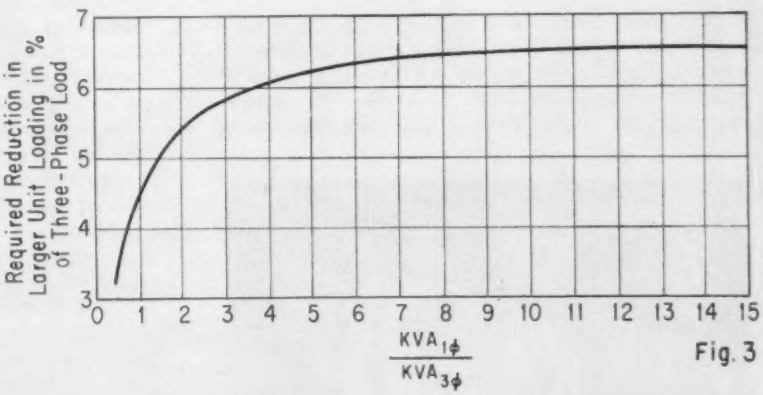


Fig. 3

REQUIRED LOAD REDUCTION on larger unit due to 20-deg difference in phase angles of loads is shown by the curve in percent of 3-phase load. Curve is based on connection of the larger transformer in the leading phase

SURFACE is rebuilt by metalizing, after scored inner surface has been ground out

Gear Reconditioning Method Saves Time, Money

INNER SURFACE is machined to exact dimensions after build-up by metalizing, for shrink fit with bushing

New Orleans Public Service Inc has developed a quicker and more economical method of reconditioning worn gears in oil circuit breakers.

In the past the inner steel bushing of the gear was pressed out of the gear with a hydraulic press. Then, a new bushing was machined to exact dimensions and shrunk by refrigeration for insertion within the gear ring. Holes were then drilled and tapped for the keeper screws to prevent movement of the two parts.

With the new method, the scored inner surface of the steel bushing is ground out, built up by metalizing, and machined to exact dimensions. The new method saves a considerable amount of time and is more economical.

Reeler Simplifies Sling Making, Rope Coiling

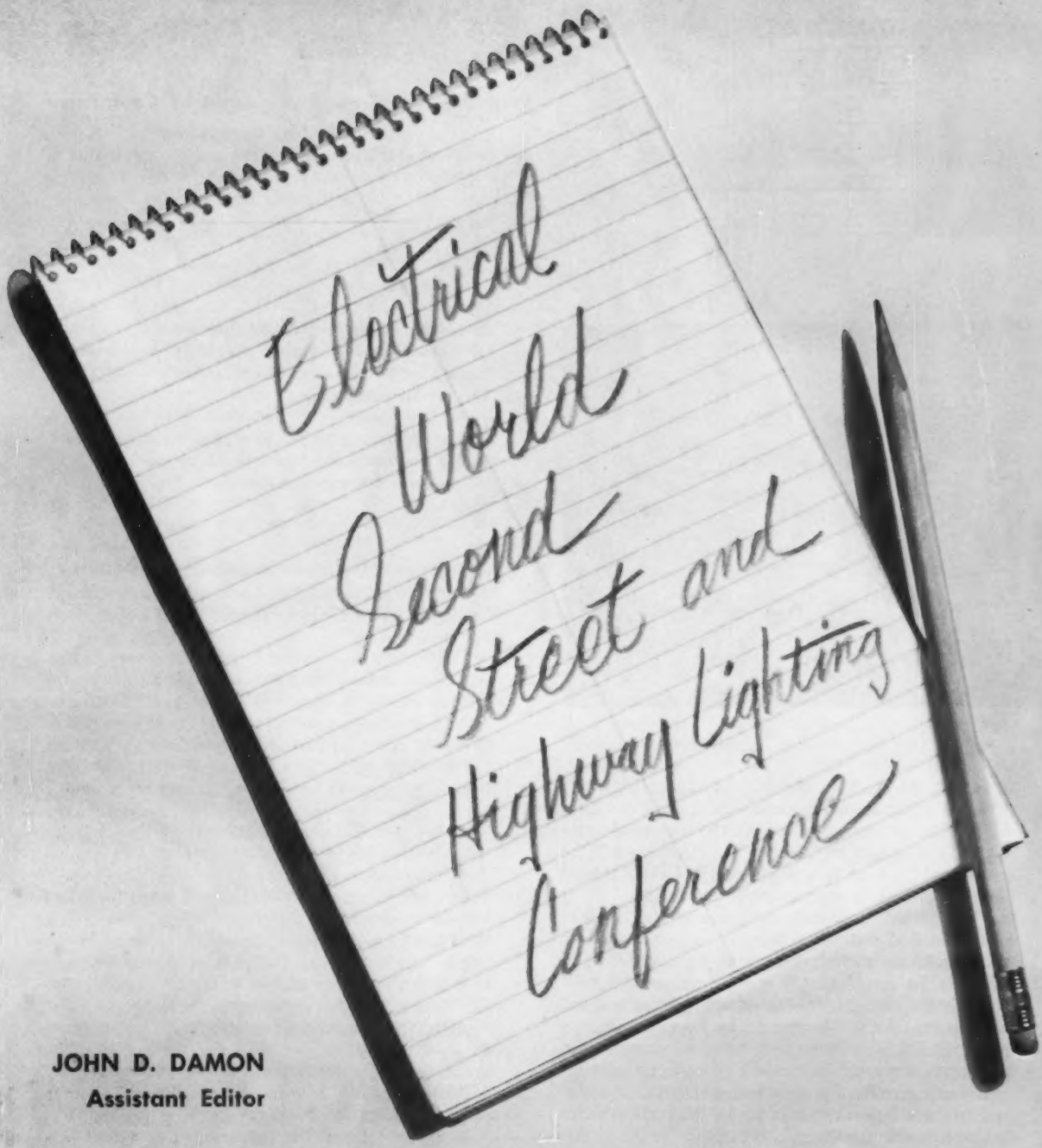
J. C. VERDIECK, Superintendent, General Service Dept, Portland General Electric Co, Portland, Oregon

A simple, inexpensive reeling device, job-fabricated at Portland General Electric Co, easily coils rope to approximate lengths for breaking down a bale into slings, handlines or coils. The device eliminates the tangled mess of lines that often occur when numerous slings and handlines are made up.

The device, developed by tool repairman Lyle Foltz, consists of a ¾-in. steel axle upon which is assembled a 1½-in. steel pipe coil bar. The axle rotates in strap bushings mounted on the building support beams. The coil-bar contains forked guides at both its ends. Also, a rotatable wooden handle is bolted off the center of the coil-bar. Various size coil-bars are available. A short coil-bar, with a spring tension release on one side of the fork guides, is used for coiling-off rope.

To make a number of slings or handlines of the same length, the free end of the rope from the bale is affixed to guide of the proper size coil-bar. The coil-bar is manually rotated until the proper number of single coils have been wrapped. Then, correct lengths of rope for individual slings or handlines are achieved by cutting each full turn of rope.

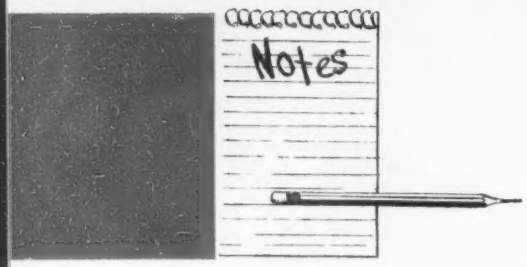
Rope is "coiled" just as described above except that after the proper length of rope has been wrapped on the short coiling-bar, the entire coil is slipped over the spring-loaded-release forks.



JOHN D. DAMON
Assistant Editor

Most of the problems are still here. But there has been an increased interest in street lighting at the utility level over the past two years, and there is an earnestness, which wasn't always evident before, in hopes to solve the many problems.

These were the feelings resulting from the working sessions, coffee-break discussions and banter back and forth at the luncheon tables when Electrical World held its Second Street and Highway Lighting Conference. The meeting, held Oct. 19 and 20 at Chicago's Hotels Ambassador, was co-sponsored by the Street Lighting Section of the National Electrical Manufacturers Assn and the Street and Highway Lighting Committee of Edison Electric Institute.



Interested attendees heard speakers hit hard at street lighting problems. Residential streets and highways are still sadly lacking in adequate, or even enough lighting; realistic rate structures should get heavy consideration from utility management, were some of the points given heavy emphasis

■ Setting the tone for the meeting, and telling why EW felt a second conference was necessary, Editor C. F. Hochgesang said, "Didn't the first conference (held in Chicago in October, 1958) solve all the problems? Not on your life! And if it had there'd be a brand new set-up waiting for us today.

"We decided to check the pulse of the industry again, to find out what changes have been made, what problems solved, what new ones born."

While he noted that a no longer controversial point is the recognition that street lighting is good community relations for the utility, he said a utility's responsibility is to determine what its communities and customers want in the way of service that electricity can provide and then to provide it.

For the utility it means a higher volume of better business which equals, at this point, a higher return on total investment.

"The basics of rate-making require that each load stand its equitable costs . . . but deeper considerations may suggest that some loads be subsidized. We hate to see any load not stand on its own two feet. But if any load must do so we'd nominate street and highway lighting."

Other reasons for the assemblage of street lighting experts were advanced by EEI's Edwin Vennard.

"One of the reasons . . . is to appraise our rate of growth in this important field. Having taken its measure, we must then decide whether that growth rate is satisfactory to us. If we find that it is not, we must then lay plans for improving it."

Vennard suggested that revenue alone should not be the factor in deciding the merits of better street lighting.

"The power companies are by their very nature tied to the service areas they serve. If a town begins to look seedy the company cannot pick up its generating plant and power lines and move somewhere else. The company can best help itself by advancing the condition of its service area. There is a definite benefit to the power supplier in the over-all economic effect of programs as stimulated by street lighting. This is one of those hidden values that require special weighting in evaluating the cost of furnishing this particular service."

One of the prongs which has motivated increased interest in street and highway lighting at the utility level has been the recent upsurge of interest in the minds and actions of the general public. Helped in part by recent articles in national magazines on the benefits of street lighting, and advanced by just common realization that good street lighting is a must for a progressive community, the public is demanding good street lighting.

And the trend is going to continue. This was fully evident at the Thursday morning session.

If anyone stirred the conferees it was that session's opening speaker, Mrs Dexter O. Arnold, first vice president of the General Federation of Women's Clubs.

" 'Shadows fall behind us as we walk into the light.' I ask you to work with us to provide that light and to eliminate the shadows," was her plea.

Spurred by the Street Lighting Awards which will be given to GFWC members by *Readers Digest* for activities in seeking to obtain modern street lighting for their communities, Mrs Arnold said that the women's clubs main desire will be to improve the community itself.

"Our women are convinced that safety code light-

Is street lighting keeping up with urban redevelopment, street lighting men asked. Both luncheon speakers covered this topic. Their conclusion: Not now but something must be done.

ing for every mile of street in this country's cities and towns, plus adequate lighting for intersections, turn-offs, interchanges, underpasses, and other danger spots, would be worth sacrificing that carton of cigarettes which is about what it would cost per person per year."

To turn shadows into lights comes from public awareness, according to Mrs Arnold, and the women of the GFWC are ready to try to produce that light. But while they have leadership, enthusiasm, sympathy, and understanding concern, they must have direction and guidance and the cooperation of utility and municipal officials.

Some attendees gathered in the reception room off the Ambassadors' Guild Hall, where the sessions were held, questioned what was the market for street lighting.

Their answer came Thursday morning when they were told:

Street lighting will become one of the greatest all-time markets in years to come. The field is wide open for new and increased sales, particularly in the lighting of residential streets, and new highways.

Street Lighting: 'A Gold Mine in the Sky'

R. E. Ballard, pinch-hitting for Connecticut Light & Power Co President Sherman Knapp, said that in dollars and cents, if this "gold mine in the sky" is tapped on a nationwide basis, by the year 1965, utilities can expect a 60% increase in annual revenue, or some $246 million more than at present. The manufacturer can look forward to the sale of some 950 thousand additional luminaires.

If all utilities promote street lighting on a nationwide, cooperative basis, they can count on an ultimate revenue of $1 billion; the manufacturer will see 20 million luminaires in service.

But if this potential is going to be reached one way will have to be through realistic rate structures.

Ebasco's T. L. Sharkey, faced with investigating rates and regulatory problems of street lighting service for the Conference, was questioned during his research why anyone would be interested in street lighting. "Utilities don't earn much from it," it was suggested.

Sharkey said there was a way out. To put street lighting on a self-sustaining basis, utilities should:

1. Determine the present level of earnings on the investment in facilities devoted to furnishing street lighting service.

2. Review the factors which have caused the earnings to remain depressed in the past and the extent to which they will affect future operations.

3. Analyze return by various sizes and types of luminaires to see if adoption of modern standards of illumination with fewer types and higher lamp ratings would make rates more compensatory.

4. Study the use of multi-part rates for fixed charges on equipment, maintenance and supply of electricity to better identify costs.

5. Appraise the effect of transfer of ownership of heavy investment facilities to municipal or other local governments.

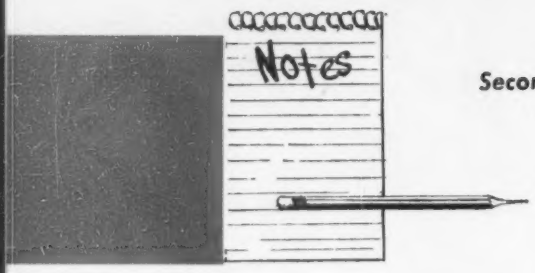
6. Make some estimate of the "customers" ability to pay for adequate lighting at truly compensatory rates.

Another approach to this age-old problem was explored by J. A. MacCracken, lighting engineer with the New England Electric System. His theory: Appraisals of the street lighting business have too often been based upon emotional approaches. Businessmen should take a rational approach, and this requires recourse to sound business and economic theory.

Basic economic theory, said MacCracken, is concerned with the concept of productivity in assembling the factors of production to arrive at the lowest unit cost to the consumer for goods and services. Competition places the low cost producer in a preferred position.

The electric utility as a natural monopoly is a decreasing cost industry. Thus, increased output—light on the street in the case of street lighting—results in continually lowering unit costs. This results from lack of competition in kind.

MacCracken feels this concept points to the need for promotion or sales to keep the customer in a continuing, more favorable, position cost-wise, thereby expanding his demand and with it the utilities investment and so its profit.



Second Street & Highway Lighting Conference

Both the utility and the manufacturer have a right to earn a fair profit from street lighting. But it is the consumer who profits most MacCracken said.

There is a construction boom going on in the big cities across the land. Whole sections are being torn down and replaced with modern, straight-line structures. It's the trend to urban redevelopment and utilitymen are concerned about whether or not street lighting is ready to play its role.

Nationwide urban renewal, an amazing construction boom and a large increase in nighttime shopping are revolutionizing street lighting standards in the US.

This was the view projected by W. W. Sproul Jr, vice president, general products, Westinghouse Electric Corp, and seconded, in part, by James E. Lash, executive vice president of ACTION.

Sproul believes that in the future street lighting will have to match what is going on in the country.

Yesterday's street lights don't fit in the new picture. Each area of new buildings or urban renewal project becomes a starting point for modern street lights which should speed up the change throughout the city.

Another spur to the street lighting business, envisioned by Sproul, is coming from the widespread shift to nighttime shopping. It has been estimated that one-half of all retail selling in the US is now being done after 4:30 pm. This will require better street lighting.

Lash said, "There is a tremendous tide running in America today to make our cities decent places in which to live. Good cities are well-lighted cities and you who are concerned with street lighting can run with this tide . . . but you can also make the tide run stronger in your direction."

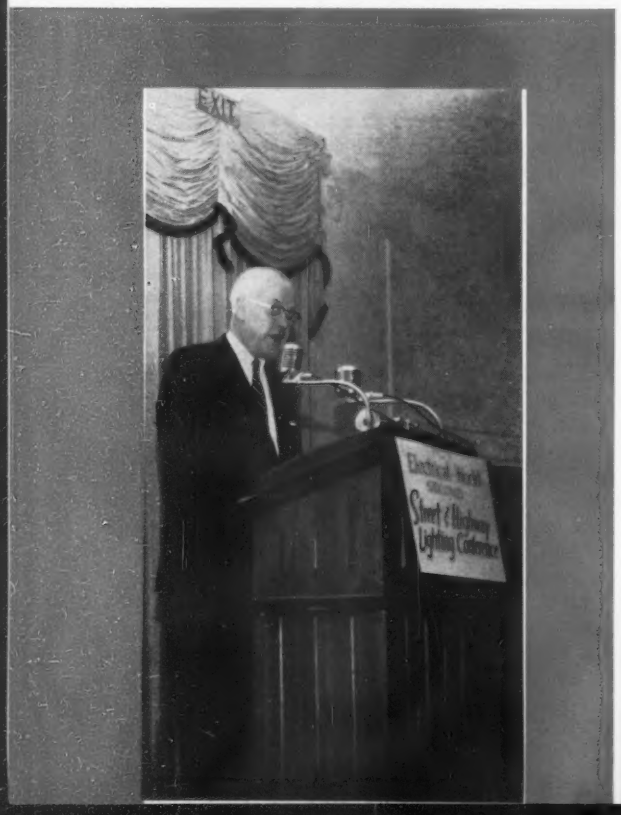
Lash feels that street lighting, like many other things in metropolitan areas, is coming on a "hit or miss basis, maybe now, maybe later." This is not on a planned basis that is really needed, he said.

Many of the conference's line-up of speakers touched on the important role for residential street lighting, and the crying need for more and better lighting in residential areas.

But it was up to Cleveland Electric Illuminating Co's Elvy E. Gayman to paint the whole picture. The potential for residential street lighting hasn't even been scratched yet, was the summation of his first broad stroke. Nationally the potential is a little more than five times what it is now, he went on to say.

"But national figures mean little," said Gayman. "Each of you has to figure out his own potential. If you are inclined to favor the commercial streets—and they have three times the total lighting residential streets have—you can easily triple the number of lamps and consequently your gross revenue from street lighting sources."

To upgrade residential lighting, he suggested: Preach the gospel of Illuminating Engineering Society (IES) minimum recommendations, (Let's don't be content with a pretty good job on the commercial streets, only to have intersectional darkness in the neighboring residential areas"); press for the use of really modern luminaires, ("I think it 'unworthy' of our industry to continue to put up fixtures from the oxcart age"); get top management's approval, ("Show management how IES street light-



Chicago's Johnson said public backing has spurred relighting program. Traffic deaths have declined from 458 in '52 to 130 for '60's first 7 months

ing brings back more to the company than the indicated 2% of gross revenue").

If there is any one other area that is sorely in need of more lighting it's the nation's highways. Yet traffic deaths could be cut in half if the nation spent as much for adequate roadway lighting as it now spends to mow the grass on the rights-of-way, or to pick up the debris.

Calling for a "Crusade of Light," Line Material Industries, McGraw-Edison Co's Stacy Standley said that although two-thirds of the traffic leaves the road before dusk, well over half of the traffic deaths occur at night. This represents an economic loss to the nation of about $3 billion.

Yet a "state of paralyzing confusion exists today over the subject of where highway lighting can and should be planned on the 41,000-mile Interstate Highway System. To make matters worse we have no guarantee that adequate lighting will be installed," he said.

Adequate lighting must be included for the ten critical areas of driver decision or there will be two night traffic deaths for every one that might occur with proper lighting, Standley concluded.

One of the big problems is many public officials have not been convinced of the value of adequate lighting, and evidence to support those views is not always available.

However, Holophane Co's Warren H. Edman, chairman of the IES Roadway Lighting Committee on Standard Practice, said that the present practices are being revised.

Conference gave street lighting men time to discuss their own reactions to problems posed by speakers. Private lighting is presenting problems between utilities and electrical contractors; bulk of whole market is in residential lighting, many agreed.

Dr H. Richard Blackwell, director of the Institute for Research and Vision, Ohio State University, who is well known for his recent work on interior illumination, is now conducing studies for street and highway lighting.

While loath to make any predictions, Edman said, "I think the Blackwell data will show our present minimum recommended footcandle levels are too low."

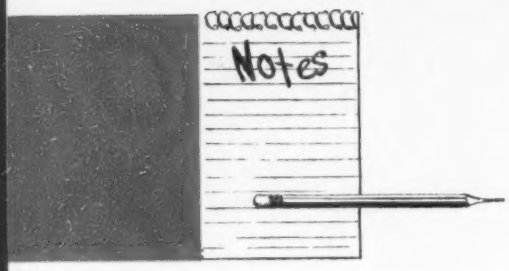
There is further need for cooperation among utilities, manufacturers, and municipal governments, but important strides have been taken. This was agreed upon by a panel consisting of C. E. Waldron, Niagara Mohawk Power Corp; J. Stanford Smith, General Electric Co, and Ralph H. Sprungman, City of Minneapolis.

Waldron said that although he foresaw no lack of cooperation all had their own problems. The manufacturer spends time and money on research for street lighting equipment. Such new equipment may not receive expected utility endorsement. On the other hand, the municipality sometimes wants special features of design in equipment so that there may be local or national reference to originality.

He urged the municipalities to have their officials become thoroughly acquainted with IES-ASA recommendations.

Smith foresaw a surge in interest in street and highway lighting which "provides an unprecedented opportunity for government officials, utility officials and manufacturers to work together creatively to serve the public successfully and profitably."

It is in the interest of all citizens to promote



lighting that is profitable for utilities and manufacturers as well as useful to the public.

And there are ten reasons for the mushrooming interest in street lighting modernization:

- Street lighting is the mark of a progressive community.
- Adequate lighting can save 10,000 lives a year.
- It is a non-fluctuating load that fills the night "valley."
- New light sources provide opportunity for "creative rate making."
- New product developments cut both installation and maintenance costs.
- Exceptional price values in lighting equipment.
- Trend to the higher light levels.
- An increased demand for residential lighting.
- The growth of private lighting.
- Public demand for better lighting.

Chicago's extensive city-wide relighting program was detailed by the host city's Commissioner of Department of Streets and Sanitation, Lloyd M. Johnson. Among his points: Public demands have resulted in increased levels, and public awareness of the benefits of improved street lighting was instrumental in willingness to vote financial support.

Tying in with Mrs Arnold's remarks concerning the support offered by women's clubs, Edmond C. Powers, educational director of the Street & Highway Safety Lighting Bureau, said, "Since it is imperative that we be ready to . . . receive the women when they come, I ask the electric utility, is it ready? Is it ready with a planned program, a realistic rate structure, proper organization, and responsibility based in the right person?

He said utility management should support that individual, and the municipality should have a program of modernization with the costs and technical features worked out.

Mrs Dexter O. Arnold (left) offered backing of women's clubs across the land in cause of better street lighting. W. W. Sproul (right) envisioned boom in street lighting due to night shopping

Reap Public Relations Benefits

The exceedingly important role public relations plays in street lighting operations, as pointed out by many speakers before him, was succinctly wrapped up by Middle West Service Corp's Vice President Robb M. Winsborough.

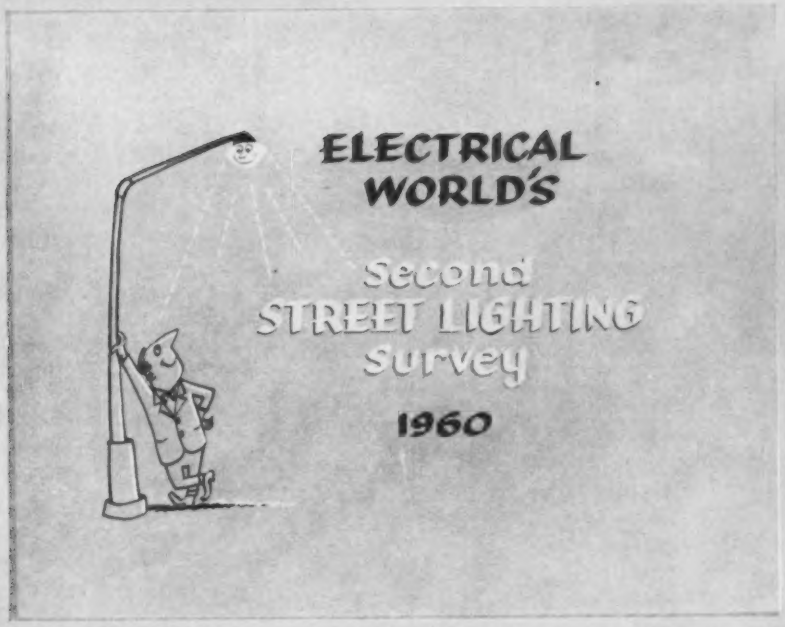
There is a great deal of confusion in the minds of the public as to who is responsible for street lighting. This confusion carries over to the attitude they feel about the electric company. "This indicates we could probably reap a good public relations advantage from the improvement in street lighting."

There are applications in Europe which have a direct interest to street lighting men in the US. Among them, according to Lighting Engineer John W. Young, are optical designs of luminaires which incorporate the cut-off principle; mercury and sodium multi-lamp fixtures used with two or more lamps per fixture; and the trend to large light sources for over-all economy.

The Conference wound up with a presentation of three successful street lighting programs, enveloping many of the practices heard in the two-days.

Robert L. Sawyier, Pacific Gas & Electric Co, told of his company's Master Lighting Plan which helped increase the number of street lights from 53,000 in 1945 to 150,000 in 1960. Alabama Power Co's A. F. deFuniak II said his company uses the "soft sell approach"—lead municipalities "gently and quietly" down the better street lighting route, staying within the scope of the ability to pay.

In the past ten years, Detroit Edison Co has added 4,100 street lights per year; for the past five years it has averaged 4,600 installations yearly. The program is based on reasonable rates and good service, said Detroit Ed's George K. Glass.



Pick-up in Interest Seen in EW Survey

What are the facts about utility attitudes and practices regarding street and highway lighting?

Using the Street Lighting Survey conducted two years ago as a launching pad, *Electrical World* this year went even farther into the feelings about street lighting at the utility managerial level.

In most cases where comparisons are possible there is a noticeable pick-up in interest but not as progressive a one as might have been hoped for, judging from the enthusiasm of the first conference in 1958, and the increased interest and action evident at *Electrical World's* 1960 Second Street and Highway Lighting Conference.

Results of this survey were gathered from 123 returns.

Who is responsible for street lighting activities?

There was a virtual tie between the engineering and commercial sales departments, with the rest divided between the industrial, lighting, managerial, sales manager and supervisor categories (See Chart 2).

To elucidate on these classifications: Engineering ranges from the street lighting engineer, or illuminating engineer, to electrical, power sales, or design engineer. Commercial meant mostly the commercial manager. Lighting titles were mostly some form of street lighting persons (other than engineer) whether he was the street lighting representative, street lighting supervisor, or director of lighting sales.

Managerial was used literally and covers promotion managers, area development managers, and managers of government sales or public services. The two supervisors reported as being in charge of street lighting matters were supervisor of rates, and supervisor of municipal sales.

There were also nine companies where street lighting comes under the realm of vice presidents—and in one company the president is the workhorse and among his duties is responsibility for street lighting.

Department-wise the figures are shown on chart 3.

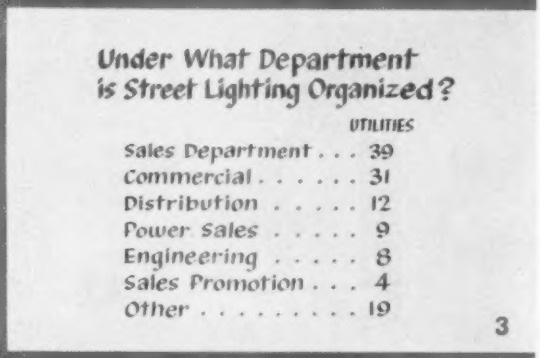
The groups are fairly self-explanatory except for the last classification. Into this was lumped "street lighting department" (only two utilities had a department so named), public relations, utilization, electrical, managerial, and rates. Also, marketing, operations, new business, area development, municipal affairs, and the construction division.

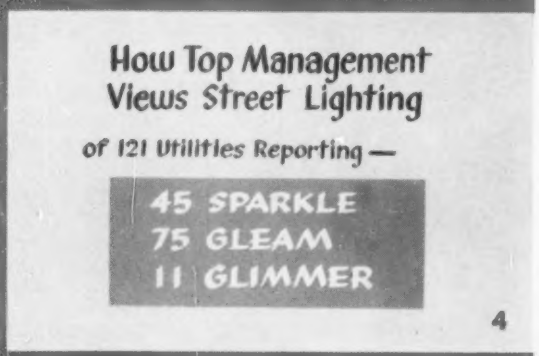
Just how do the nation's utilities look upon street lighting? Do they like it? Is it profitable? Is it worth giving more attention to?

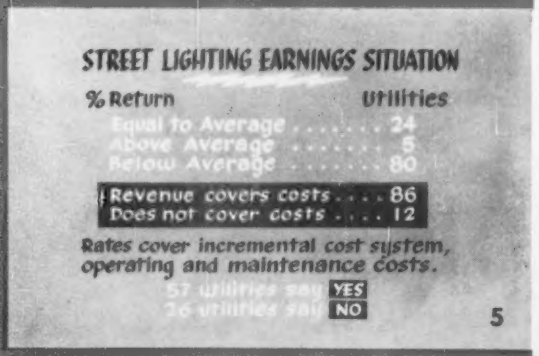
When top management looks at the street lighting picture, does it sparkle, gleam, or just glimmer.

Of 121 utilities reporting . . . 36%, sparkle; 54%, gleam, and 10%, just glimmer.

Who's Responsible for Street Lighting Activities?
UTILITIES
Engineering 30
Commercial 29
Industrial 14
Lighting 12
Managerial 11
Sales Manager 10
Supervisor 4
2


Under What Department is Street Lighting Organized?
UTILITIES
Sales Department . . . 39
Commercial 31
Distribution 12
Power Sales 9
Engineering 8
Sales Promotion . . . 4
Other 19
3




STREET LIGHTING EARNINGS SITUATION
% Return
Utilities
Equal to Average 24
Above Average 5
Below Average 80
Revenue covers costs 86
Does not cover costs 12
Rates cover incremental cost system, operating and maintenance costs.
57 utilities say YES
26 utilities say NO
5

But what do these terms mean?

If a utility gleams when it looks at street lighting it means it looks upon lighting as a good load builder and revenue producer, has good public relations value, and earnings are commensurate with investment and promotion expenditure, and is comparable with other loads.

Almost.

Not all utilities bought the version of this question as it was asked on the survey. Many felt it needed qualification. Of the 45 utilities who checked this answer, nine felt it had good public relations value only.

One utility said street lighting is a good load builder only, and one utility agreed with the answer for mercury and fluorescent lighting, but not for incandescent.

Majority Say Load Just Pays Way

Of the majority of companies—the 75—that gleam when they think of street lighting, they think so because the load just about pays its way and they try only to cover costs of service.

And those that just glimmer—the 11 utilities—say that the load does not pay its way, street lighting is sold at the barest minimum rate and there is no attempt to cover costs.

Although the majority of the utilities in this country still find street lighting load just about pays its way there has been a pick-up in interest over what was evidenced at this time two years ago. Then, only 35 of 119 utilities looked upon street lighting as a good load builder and revenue producer. This survey produced 45. Today, 75 utilities are in the middle category as against 69 in the last survey, and less are cool today toward street lighting—11 today as against 14 two years ago.

Therefore, while approximately the same percent are in the middle category as there were two years ago, due to the increased number reporting to this year's survey, a slight moving up into the top category, where utilities look upon street lighting as good load and revenue producer, is evidenced. That is, ten more utilities are in the first category today, compared to an increase of only six in the middle category. And three utilities have moved out of the slot where the load does not pay its way.

Of 120 utilities every one said that it does not use street lighting in lieu of a franchise in all of its service area, while six do use it in lieu of a franchise in part of their service area, with an average of 32.2% for those six utilities.

Have utilities made important changes in street lighting polices or practices during the past two years?

Forty of 112 utilities have.

Though their reasons for doing so were diverse, there are three areas which are getting expanded effort from utilities. They are in the form of conversion to photo-electric controls, new rates, or increased promotion, and sales efforts and manpower.

What was the average gross and net revenues per street light for 1959?

INCANDESCENT

GROSS		NET	
Under $10/light	3	Under $10	11
$10-20	10	$10-20	5
$20-30	31	$20-30	1
$30-40	32	$30-40	1
$40-50	8	Loss	3
Over $50	2		

6

MERCURY

GROSS		NET	
Under $50/light	12	Under $10	7
$50-60	14	$10-20	2
$60-70	16	$20-30	5
$70-80	8	$40-50	2
$80-90	6	$50-60	1
$90-100	7	$90-100	3
Over $100	18	Loss	1

7

FLUORESCENT

GROSS		NET	
Under $50/light	6	$1-10	3
$50-60	1	$10-20	2
$60-70	3	$40-50	1
$70-80	2	$60-70	1
$80-90	4	$100-110	1
$90-100	2	$120-130	1
Over $100	19		

8

What Equipment Goes Where?

	residential	commercial	rural roads	highways
fluorescent	95.7%	46.2%	92.7%	20.7%
mercury	4.2%	49.7%	7.2%	76.3%
incandescent	.1%	4.1%	.1%	3.0%

9

Will there be any changes in policy or practices in the near future which might change this picture?

Twenty-eight of 117 utilities expect to make some sort of change. Of those 28, 11 are going to take a close look at their rates and make a rate change, and five are going to step up promotion.

What is the street lighting earnings situation in respect to earnings of other loads in utilities? This is an important consideration to utilitymen responsible for street lighting because of their often voiced complaint of the low return on investment received from street and highway lighting.

This year, of 109 utilities reporting 22% get a percent which is equal to average, only 4.6% have a situation which is above average, and the majority, 73.4%, said the percent return is below average.

This was comparable to the last survey when three utilities reported above average return, 27 equal to average, and 85 below average.

When it comes to rates and revenues most utilities try to cover at least their costs of operation and maintenance of the lighting systems. Of the 98 utilities reporting, 87.8% said their revenues do cover operation and maintenance costs, and 68.7%, of the 83 utilities, have rates set up to cover incremental cost system, operating and maintenance costs (See Chart 5).

Two years ago, of 82 utilities, 73 had revenues which covered costs, and 63 of 83 companies had rates which covered incremental costs. So, while more utilities this time cover operation and maintenance costs, less cover incremental, operating and maintenance costs.

What were the average gross and net revenues per street light in 1959? Chart 6 shows the frequency distribution for incandescent lighting.

For mercury lighting, Chart 7, the load is in the below $70 range, although 18 utilities reported gross mercury revenues over $100.

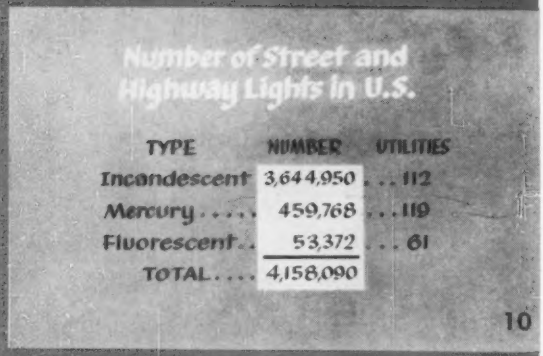
Fluorescent lighting (Chart 8) compares similarly with mercury in that 19 utilities reported gross revenues over $100.

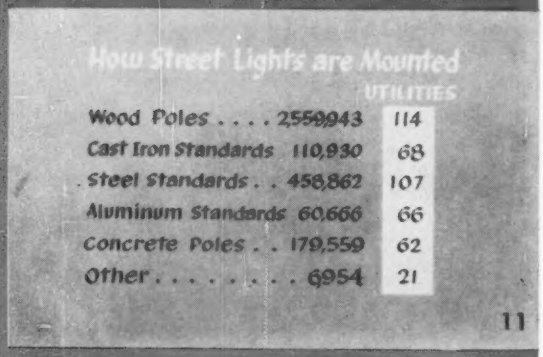
In investigating kilowatthour sales and revenues in 1959 for the nation's utilities, 116 utilities reported a total of 3,561,812,144 kwhr, with gross revenues totaling $114,712,421 (115 utilities reporting) and net revenues showing a $9,002,577 total, of the 32 utilities reporting.

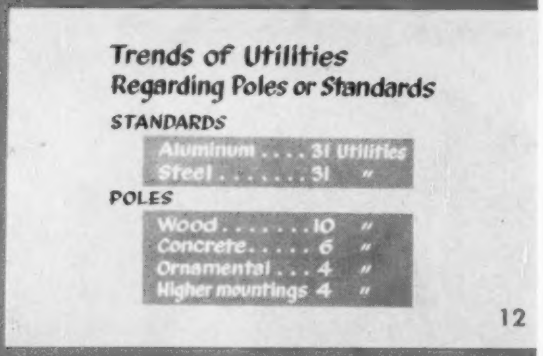
Comparing gross and net revenues for the first six months of 1959 and 1960, in both instances we find an increase in revenues, even though one utility which reported 1959 results did not answer for 1960. Kwhr sales were also up in January, 1960. Total kwhr sales for the first half of 1960 were up 98,801,360 over 1959's first half.

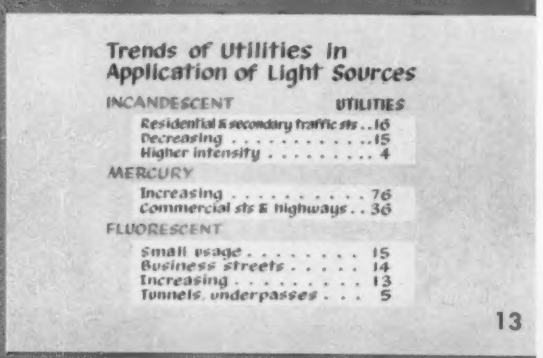
Gross revenues for all utilities reporting were up $332,671 in the first half of 1960, with one less utility reporting in 1960.

Net revenues were up $303,760 in the first half of 1960, again with one utility missing.


Number of Street and Highway Lights in U.S.
TYPE NUMBER UTILITIES
Incandescent 3,644,950 . . . 112
Mercury . . . . . 459,768 . . . 119
Fluorescent . . 53,372 . . . 61
TOTAL 4,158,090
10


How Street Lights are Mounted
UTILITIES
Wood Poles 2559943 114
Cast Iron Standards 110,930 68
Steel Standards . . 458,862 107
Aluminum Standards 60,666 66
Concrete Poles . . 179,559 62
Other 6954 21
11


Trends of Utilities Regarding Poles or Standards
STANDARDS
Aluminum . . . . 31 Utilities
Steel . . . . . 31 "
POLES
Wood . . . . . 10 "
Concrete . . . . . 6 "
Ornamental . . . 4 "
Higher mountings 4 "
12


Trends of Utilities in Application of Light Sources
INCANDESCENT UTILITIES
Residential & secondary traffic sts . . 16
Decreasing 15
Higher intensity 4
MERCURY
Increasing 76
Commercial sts & highways . . 36
FLUORESCENT
Small usage 15
Business streets 14
Increasing 13
Tunnels, underpasses . . . 5
13

What kind of equipment goes where? This question appeared on both the 1958 and 1960 surveys. Results show a trend to mercury equipment in all areas, with strong jumps to mercury on highways and commercial streets.

Residential streets, according to the utilities surveyed (Chart 9), showed figures very close to the last survey. However, on commercial streets, mercury this year jumped 1.4%. Rural roads picked up 3.6% in mercury equipment, and highways added the largest percentage of equipment—up 17.6%.

As shown the chart, incandescent still dominates on residential streets and rural roads and farms.

How many types are there of each of these units?

Chart 10 shows the breakdown as revealed by the survey. Total units reported was 4,158,090 of which 87.7% are incandescent, 11% mercury, and 1.3% fluorescent.

Of the total number of street lights on utility lines, they are seen on many different types of standards.

The total of all these standards does not equal the total number of street and highway lights reported because some of the utilities were not able to give a breakdown.

Wood Poles Predominate

Nevertheless, wood poles do predominate. Also more utilities reported use of wood poles in their service areas (Chart 11).

Steel standards were next, followed by concrete poles, cast-iron standards and aluminum standards.

Twenty-one utilities reported miscellaneous standards. Many of these are on underpasses.

Utilities were queried to see if they discerned any noticeable trend regarding poles or standards. The trend: Definitely toward aluminum or steel standards (Chart 12).

In light sources there seems to be a definite favoring of mercury light sources (Chart 13). Of 107 utilities reporting, 71% said that mercury is increasing in their service area. This increased usage is situated on commercial streets and on highways, according to 33.6% of the utilities.

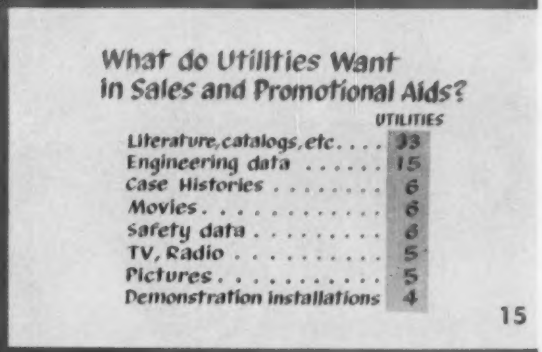
Four utilities, however, foresaw a mercury trend to residential streets. Other principal answers were spread over interchanges, parking areas and shopping centers.

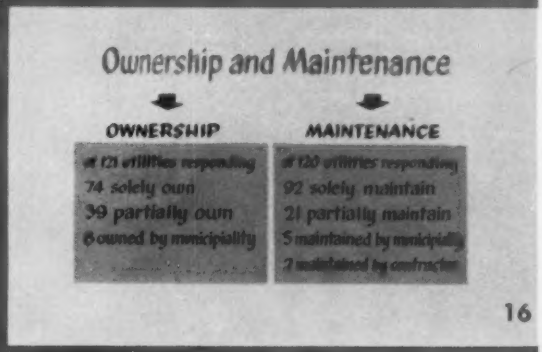
Incandescent lighting will continue to dominate on residential and secondary traffic streets according to 28% of the utilities. Some, however, felt incandescent street lighting is decreasing in usage.

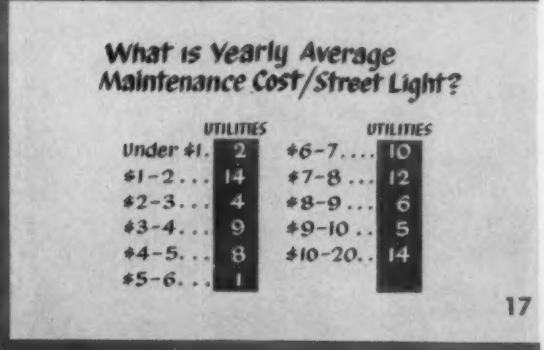
Fluorescent lighting is going to be found more and more on business streets in the future, though many utilities feel fluorescent is going to gain favor all around. Tunnels and underpasses will also come in for increased fluorescent lighting application.

A couple of utilities felt the cost factor favored mercury. One-hundred-and-one utilities (85%) favor some sort of standardization of street and highway

Would Utilities like to see Specific Pieces Standardized?
YES 81 UTILITIES NO 24
FIRST CHOICE
LUMINAIRES 21
CONTROLS 8
FIXTURES 6
14


What do Utilities Want in Sales and Promotional Aids?
UTILITIES
Literature, catalogs, etc. . . . 33
Engineering data 15
Case Histories 6
Movies 6
Safety data 6
TV, Radio 5
Pictures 5
Demonstration installations 4
15




What is Yearly Average Maintenance Cost/Street Light?
UTILITIES
Under $1. 2
$1-2 . . . 14
$2-3 . . . 4
$3-4 . . . 9
$4-5 . . . 8
$5-6 . . . 1
UTILITIES
$6-7 10
$7-8 . . . 12
$8-9 . . . 6
$9-10 . . 5
$10-20 . . 14
17

lighting equipment, about equal to the last survey.

Fifty-nine utilities want equipment standardized to the point of being interchangeable to help with inventory and reduce the stocking problem.

A couple of utilities threw up a "stop" sign. Street lighting should not be too standardized so that progress in the art would be retarded, said one. While another echoed, "No standardization which would inhibit progress."

Most of the companies (77%) reported they would like to see some form of standardization. They were asked to list the equipment in the order in which they favored standardization. Chart 14 shows the first choices of the majority of the utilities.

To sell street lighting, utilities have to go to the public and municipal officials armed with well-organized, well-documented material and aids on the benefits of street lighting.

This year's street lighting survey revealed what utilities feel they are not getting enough of—but would like to have—from street lighting equipment manufacturers in the way of sales and promotional aids (Chart 15).

Literature and catalogs seem to be wanted by most. This also means promotional material, brochures, factual articles and national publicity.

Many utilities mentioned the *Readers Digest* (June) and *Coronet* Magazine (February) articles on street lighting. A lot of companies would like to see similar articles in other national publications, feeling that this will help educate the public to demand better street and highway lighting.

Fifteen utilities want engineering data such as design tables, dimensional data, layout suggestions and photometric data.

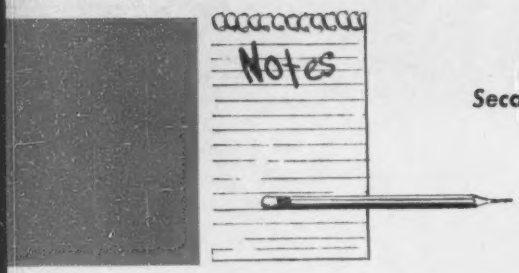
Six also want safety data showing why improved street and highway lighting is the safety-plus value needed in community operations to cut traffic accidents, crime, vandalism and the like.

Four utilities asked for demonstration-type installations to be installed in a town to create interest in modernization of street lighting.

Other requests of interest included speakers for municipal meetings; closer contact by manufacturers for advice on possible new developments and equipment; participation from manufacturers in the education of street lighting buyers through supper meetings; and inspection trips to manufacturing plants to see lamps and fixtures.

Do utilities see any trends regarding street lighting controls? There was little doubt in the minds of utility street personnel queried. The trend is to individual photo-electric controls. Ninety-five utilities or, 81%, voted this way.

Who owns the street lighting systems in the cities and towns across the country? (Chart 16.) Of 121 utilities which responded to this question, 61% solely own the systems in their service area. Thirty-two percent partially own their systems, while 7% are owned by the municipality.



HOW WELL ARE STREETS LIGHTED TO IES STANDARDS?

	residential	commercial	rural roads	highways
To Code Level	13.8%	43.2%	5.8%	49.2%
Below Code Level	84.6%	48.1%	93.4%	47.9%
Above Code Level	1.6%	8.7%	.8%	2.9%

The majority of the systems, whether or not they are owned by the utility, are utility-maintained.

Of 120 utilities, 77% completely maintain their own systems, while 18% partially maintain.

Checking the last EW survey for comparison, one finds a slight change from utilities completely owning their systems to partially owning the systems. Compared to the 74 who now own their systems solely, 80 did two years ago, while 39 partially own their systems now, and 31 did two years ago.

A few more utilities now solely maintain their own systems—three more, to be exact. Partial maintenance remains about the same. There is one more municipality maintained system now and one less maintained by a contractor.

What is the maintenance cost per street light, whether maintained by the utility, a municipality or a contractor? The frequency distribution is shown in Chart 17. The national average figures out to $6.90.

Fourteen utilities said there was a significant difference in the cost depending on who maintains the lights.

Various reasons were given. Among them were that utility maintenance costs are probably higher than municipality or contractor costs; the municipality makes no charge to equipment and has a lower wage rate; and one utility said contracting for replacement is more economical due to the contractor's specialized equipment.

In the final analysis, the effectiveness of the street lighting systems comes right down to how well they are lighted.

Many of the answers upset old traditions. The current figure given for residential streets is that only 2% are lighted to code level. EW survey shows 13.8% are lighted to code (Chart 18).

There are, of course, a couple of explanations. It is hard to set just what are minimum code levels. Not everyone interprets them in the same way. Also, perhaps the 13.8% is true in the areas surveyed, even though it might not be nationally.

Highways and commercial streets are the areas best lighted to code level, while rural roads fare the poorest.

So, while, as evidenced by this survey, utilities are generating more interest toward street lighting, there is still a noticeable lack of concrete results. There are, of course, many considerations, but if the enthusiasm generated at EW's conference is any indication these hurdles will soon be overcome.

Reprints of the Electrical World Second Street and Highway Lighting Conference, along with the complete Conference proceedings, are available for $10 a set.

INTRODUCING...

the efficient,

new mercury

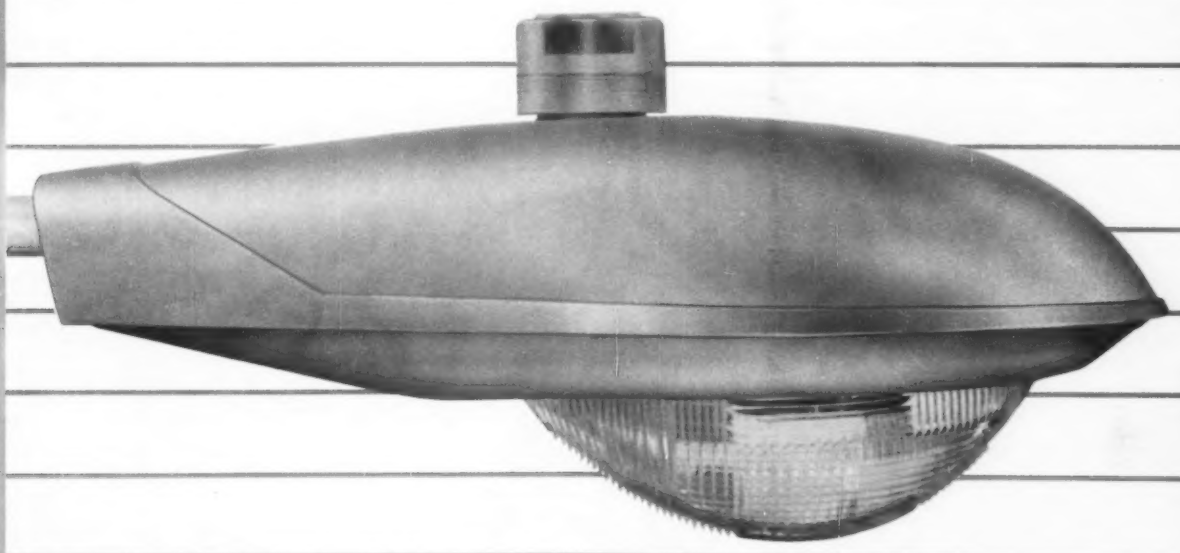
luminaire that

makes code-level

residential lighting

practical for

every community



NEW GENERAL ELECTRIC M-250R LUMINAIRE

Residential lighting profitable with economical new mercury unit

Exclusive design aims light to streets, sidewalks . . . away from bedroom windows

At last! A luminaire that is specifically designed for "profit-making" residential application. Now, with the new General Electric M-250R mercury luminaire, you can do the job you've always wanted to do . . . to serve your communities with modern, efficient residential lighting—*and at a fair and reasonable profit!*

Smartly styled, economical G-E M-250R luminaires now make code-level residential lighting a practical, profitable venture for every utility. Here's how:

Unmatched efficiency—The new G-E M-250R luminaire, with "bonus-line" mercury lamp, delivers nearly three times as many lumens of useful light six times as long as does a filament fixture and lamp of equal wattage rating. For example, a 175-watt M-250R luminaire produces 7000 lumens; a filament fixture of comparable wattage, only 2500 lumens.

What's more, you get unparalleled photometric performance from General Electric's exclusive new turning-prism refractor which bends light a full 70 degrees—more than any other refractor made. Now, light is turned away from bedroom windows and directed on the street where it belongs!

Unmatched operating economy—Following IES lighting recommendations, you could code-level light your residential streets by placing a filament fixture every 120 feet. But, you can light the same streets—to higher than code-level minimums—with General Electric M-250R mercury luminaires spaced every 240 feet . . . *exactly half as many luminaires, poles, and brackets!* You get up to 60 percent more light per operating dollar, more useful light, and at bargain over-all costs!

Unmatched appearance—Functional, modern styling of the new General Electric M-250R luminaire complements the appearance of any modern neighborhood in which it's seen . . . whether at night or by day.

Increased nighttime safety—with fewer crimes and lower traffic-accident rates—is still another advantage of modern, mercury lighting for the residents of your community.

SPECIAL INTRODUCTORY OFFER

General Electric is making a three-unit "Light-a-Block and SEE" package offer to you for a limited time. You can set up permanent demonstrations on a block in each community you serve. Let everyone see the beauty of residential neighborhoods spring to life under modern lighting. Show municipal officials the lighting they will want to have . . . and that you will be glad to furnish. Let every official of your company see for himself—under controlled conditions—the many profitable, practical benefits of the M-250R luminaire.

Start your "Light-a-Block and SEE" projects right away! Your General Electric Sales Engineer will be happy to give you the details. And, for the new M-250R descriptive bulletin, write General Electric Co., Section 460-10B, Schenectady, New York. *Outdoor Lighting Dept., Hendersonville, N. C.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW GENERAL ELECTRIC M-250R LUMINAIRE

PREFERRED LIGHTING...

8 reasons why you get more light per dollar

General Electric *PREFERRED LIGHTING* is based on a simplified line of outdoor-lighting products which actual purchases show most customers prefer. Here are 8 ways *PREFERRED LIGHTING* adds up to more light per dollar on your streets and highways:

- A full selection of modern, fast-moving equipment.
- One- to four-day delivery on complete lighting systems.
- Easy application of components or complete systems.
- Reduced inventories for you . . . G.E. does the stocking.
- "Customer-preferred" lighting equipment . . . with built-in extra values throughout the line.
- More light at consistently low prices per unit.
- Continuing research to meet tomorrow's lighting needs.
- Creative customer service from General Electric Sales Engineers and Agents.

For full data on *PREFERRED LIGHTING*, see your G-E Apparatus Sales Engineer or Agent now. And write to General Electric Co., Section 460-09, Schenectady, N. Y. for the 28-page "Designer's and Buyer's Guide to *PREFERRED LIGHTING*" (GEA-7100). Outdoor Lighting Dept., Hendersonville, N. C.

General Electric's famous "Crossroads of Light," Hendersonville, N. C., lighting demonstration area for your use.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Electrical Equipment Orders Dip

Sharp decrease in orders from domestic users of heavy electrical equipment is noted in Edison Electric Institute's third-quarter survey covering new orders and shipments by the US electrical manufacturing industry. Steam turbine-generator orders declined notably from previous quarter and were far below last year's level.

	3 Q '59	4 Q '59	1 Q '60	2 Q '60	3 Q '60
Steam Turbine-Generators (4000 kw and larger)					
NEW ORDERS (Mw)					
Domestic	2,594	3,067	2,913	1,996	594
Export	143	140	83	295	455
Total	**2,736**	**3,207**	**2,995**	**2,292**	**1,049**
SHIPMENTS (Mw)					
Domestic	2,451	3,935	1,846	2,819	2,667
Export	15	530	207	97	8
Total	**2,466**	**4,465**	**2,053**	**2,916**	**2,675**
Hydraulic Generators (4000 kw and larger)					
NEW ORDERS (Mw)					
Domestic	137	1,195	404	1,623	296
Export	.....	.....	.....	.....	.....
Total	**137**	**1,195**	**404**	**1,623**	**296**
SHIPMENTS (Mw)					
Domestic	507	351	547	659	622
Export	.....	104	208	104	208
Total	**507**	**455**	**755**	**763**	**830**
Hydraulic Turbines (5000 hp and larger)					
NEW ORDERS (1000 hp)					
Domestic	155	596	164	2,355	1,326
Export	69	.....	108	.....	.....
Total	**225**	**596**	**272**	**2,355**	**1,326**
SHIPMENTS (1000 hp)					
Domestic	645	1,042	656	745	265
Export	.....	110	.....	.....	.....
Total	**645**	**1,152**	**656**	**745**	**265**
Power Transformers (501 kva and larger)					
NEW ORDERS (Mva)					
Domestic	8,970	16,156	20,308	13,605	12,625
Export	734	232	620	876	726
Total	**9,704**	**16,388**	**20,928**	**14,481**	**13,351**
SHIPMENTS (Mva)					
Domestic	11,063	12,599	10,971	12,552	11,059
Export	178	248	448	359	375
Total	**11,241**	**12,847**	**11,419**	**12,911**	**11,434**
Steam Generators (450 psi and higher)					
NEW ORDERS (1000 lb/hr)					
Domestic	21,058	29,707	24,760	23,723	9,375
Export	1,660	1,389	7,960	5,445	3,180
Total	**22,718**	**31,096**	**32,720**	**29,168**	**12,555**
SHIPMENTS (1000 lb/hr)					
Domestic	6,398	14,229	19,575	8,613	9,305
Export	4,814	2,146	692	1,579	1,568
Total	**11,212**	**16,375**	**20,267**	**10,192**	**10,873**

New HV Motor Control Has 'Two-High' Design

Allis-Chalmers Mfg Co has introduced the Space-Maker high-voltage motor control featuring a new, two-unit design, packaged in half the space of previous controls, with the same rating and capability as its predecessors. One motor controller is placed above the other (p 88), or the units may be grouped in line-ups, resulting in a high-voltage motor-control-center concept.

Each unit can have full rating of up to 1,750 hp maximum at 2,300 v, or 3,000 hp maximum at 4,000 to 5,000 v. Each has interrupting capacity of 150 Mva at 2,300 v or 250 Mva at 4,000 to 5,000 v through use of Allis-Chalmers' current limiting fuses. Shipment of the Space-Maker controllers is scheduled to begin next March or April.

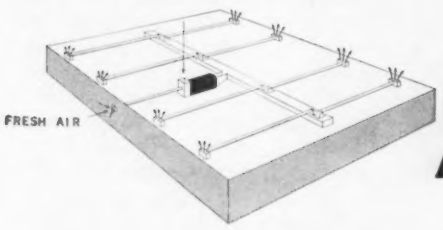
Nucleus of the new design, says A-C, is the Type 456, 5-kv, 50-Mva, 400-amp air-break contactor, evolved through arc interruption phenomena concepts and the use of mechanisms and insulating materials unique to this development. A new glass polyester, flame-retardant, non-tracking Super Pyro-Shield insulation was used.

Besides claiming the Space-Maker has the first starter in the 2,000 to 5,000-v range to employ a two-high design, A-C adds it is the first completely drawout control on the market in this voltage class and the lightest weight controller.

In designing the unit with capabilities of other h-v motor controls, A-C found the process of scaling it down dictated the contactor assembly should be completely plug-in and draw-out in operation in order to obtain the required features. The drawout feature consists of a wheeled contactor carriage which carries contactor, main fuses in their supports, main disconnecting fingers, control transformers and control transformer primary and secondary fuses, and a two-pole, double-throw test circuit switch. A simple racking mechanism enables the operator to easily and safely move the contactor carriage from the operating position

(*Continued on page* 88)

new! LENNOX *fresh air*



Controlled amounts of fresh outdoor air help make complete comfort possible.

LENNOX®

World's largest manufacturer of indoor comfort equipment

ELECTRIC HEATING

...PROVIDES COMPETITIVE ADVANTAGES NEVER BEFORE AVAILABLE TO UTILITIES

✳ *Beats the humidity and stale air problems common to tight, heavily insulated homes.*

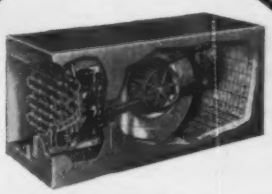
✳ *Gives complete comfort with accurate temperature control.*

✳ *Makes air conditioning inexpensive to add—helps equalize your winter and summer load demand.*

This is the heating system you can push—knowing it will benefit your customers and your company. Here's why:

Lennox Fresh Air electric heating ends moisture problems. It provides controlled amounts of fresh outdoor air to prevent dampness and stagnation. Household odors can't linger on and on. Gentle air circulation creates a refreshing atmosphere . . . *all* the heat is put to use, doesn't stratify; solar gain is distributed throughout the house. Already field reports indicate that operating costs are as much as 20% less than non-ducted electric systems.

This is a *real plus* . . . the blower, filter and ducts can be used for low cost central air conditioning. Also, advanced air filtering and purifying devices are added easily. *Your customers get 365-day comfort—you sell electricity the year around!*



Compact electric furnace—17" x 19" x 42". Zero clearance. U.L. label. 11.4 kw in two steps (39,000 Btuh). May be installed for up, down or horizontal air flow—in basement, crawl space, closet, etc. Complete flexibility of installation.

Other fresh air electric equipment

- **Heaters for individual room control**
- **Heaters for zone control**
- **Larger central units**

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FREE *electric heating manual*

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Marketing Services Dept.
706 S. 12th Street, Marshalltown, Iowa

O.K.—I want the facts. Please send 40-page illustrated book on Lennox Fresh Air Electric Heating. No obligation, of course.

Company.....

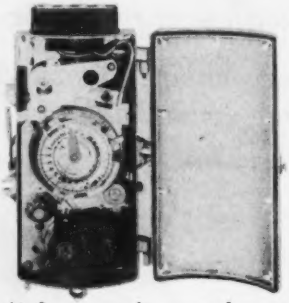
Address.....

City..... **State**.....

My Name..... **Title**.....

"CLEAN AS A HOUND'S TOOTH?"

NO... CLEAN AS A TIME SWITCH



Perhaps astronomic time switches won't ever become as popular a symbol for cleanliness, but after 90 seconds in an Acoustica Ultrasonic Unit they're *better* than "hound's-tooth clean"... *without even being disassembled.* New York City, for example, has 250,000 such switches to turn its street lights on at sunset, off at sunrise. Formerly, when airborne dust and soot clogged a switch's precision gears, it had to be torn down into 50 separate pieces, hand cleaned, and re-assembled... 30 minutes or more per switch. Now, the complete switch is placed in an Acoustica Ultrasonic Unit and in *just 1/20th of the time* is completely clean, ready for lubrication, re-installation and another three to five years of dependable service.

NEW: *Acoustica's fully transistorized "20-KC" line of ultrasonic cleaning systems brings new speed and efficiency to your production cleaning operations. Available in standard sizes from 3 to 6 gallons; special systems up to 500-gallon capacity. (Illustrated: 3-gallon SC-252 System.) Acoustica also offers a complete line of standard 40-KC cleaning systems.*

FOR COMPLETE EQUIPMENT DESCRIPTIONS AND AN ANALYSIS OF **YOUR** CLEANING PROBLEMS, WRITE TO ACOUSTICA OR CONTACT YOUR NEAREST ACOUSTICA REPRESENTATIVE.

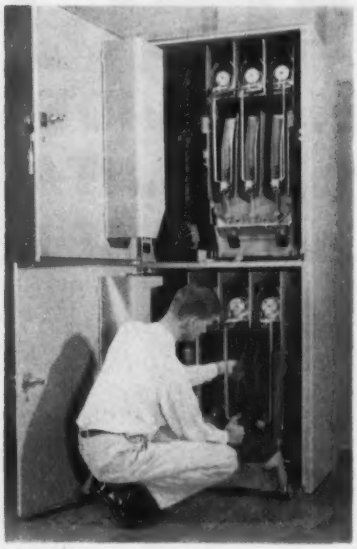
acoustica

ACOUSTICA ASSOCIATES, INC.

10400 Aviation Blvd., Los Angeles 45, Calif. • 600 Old Country Road, Garden City, N.Y.

New HV Motor Control

(*Continued from page* 85)



to the disconnected position and return.

A wheeled dolly is provided for receiving the upper contactor carriage when it is drawn out for inspection. For outdoor Shelter-Clad housings, a lift-type dolly can be used.

Arc chutes of the contactor lift out easily to expose contacts for quick inspection. Shutter (at rear of cabinet, above) isolates live line terminals when contactor is racked out.

Overload relays on the control are visible with the door closed. They are reset by buttons on the front door. For safety, the door cannot be opened until the contactor carriage is in the racked-out position.

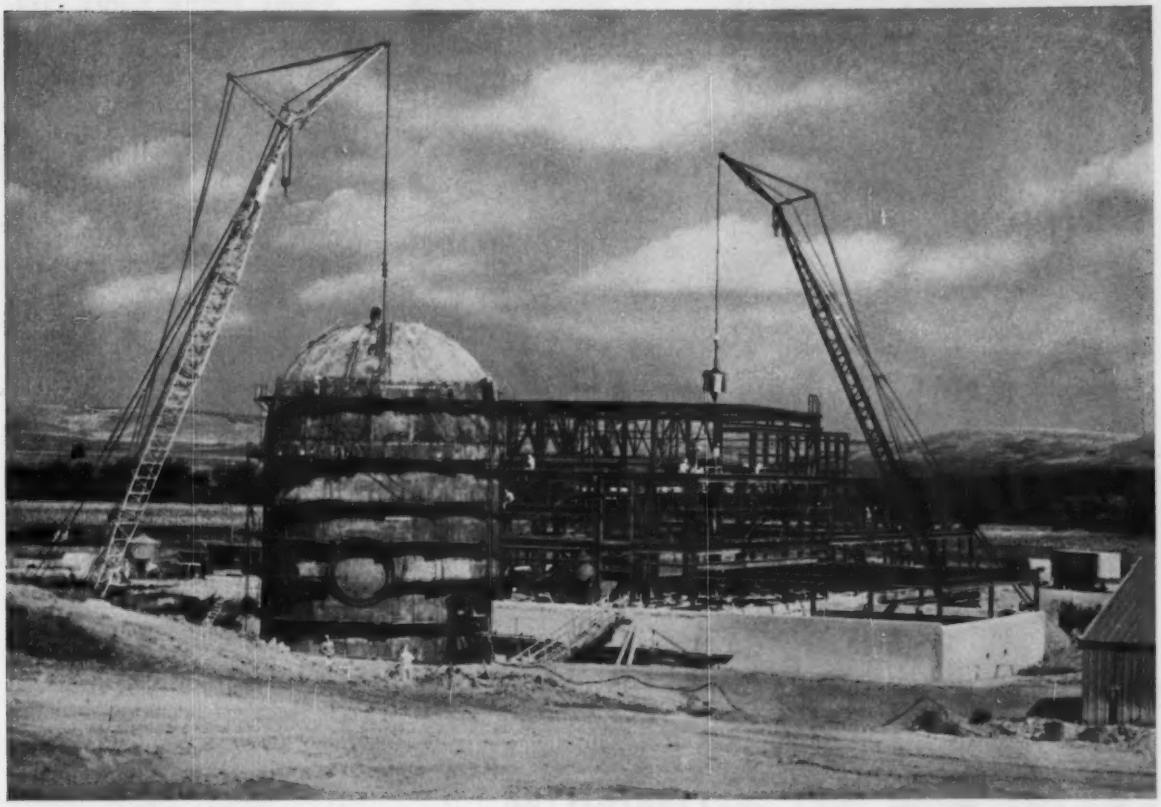
Manufacturers Report Third-Quarter Standings

Reports of five manufacturers on third-quarter earnings and sales indicate decreases in both for three and increases for two. Four firms showed decreases in their January-September figures.

Allis-Chalmers Mfg Co reported net earnings declined 88% to $1,251,383 in the third quarter, compared with the same quarter last year. Sales dropped 25% to $126,-698,400. Lower figures were at-

(*Continued on page* 90)

ALLIS-CHALMERS



A status report:

nuclear superheat...on schedule

"Pathfinder" is the country's first nuclear superheat power station under construction. It is being built by Allis-Chalmers for Northern States Power Company. Cooperating in research and development are nine other midwest utilities* and the Atomic Energy Commission.

The above photo shows the containment, turbine, water treatment and administration buildings. Construction is on schedule.

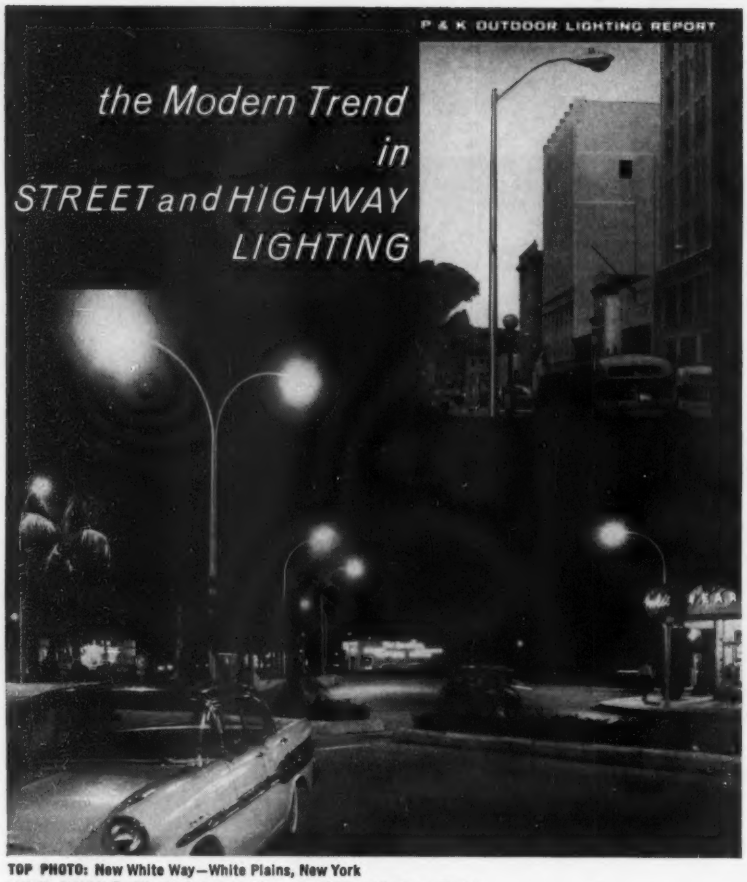
The integral nuclear superheater will provide steam at 600 psig, 825 F. Other important design characteristics include a high power density — 46 kw per liter — and controlled recirculation — 60,000 gpm.

Only Allis-Chalmers has experience in both direct- and indirect-cycle boiling water reactors, fast breeder, gas-cooled and process-steam reactors and fusion. In addition, A-C has long been a leader in such steam plant equipment as turbine-generators, condensers, pumps, valves and water conditioning systems.

For more information about Allis-Chalmers facilities and capabilities in the nuclear power field, talk to your nearest A-C representative, or write for *Bulletin 43B9541,* **Allis-Chalmers,** Atomic Energy Division, Milwaukee 1, Wisconsin. A-1382

*Central Electric and Gas Co. • Interstate Power Co. • Iowa Power and Light Co. Iowa Southern Utilities Co. • Madison Gas and Electric Co. • Northwestern Public Service Co. • Otter Tail Power Co. • St. Joseph Light and Power Co. • Wisconsin Public Service Corp.

Site of "Pathfinder" plant at Sioux Falls, South Dakota.



TOP PHOTO: New White Way—White Plains, New York
LOWER PHOTO: Traffic circle illumination—West Miami Springs, Florida

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Third-Quarter Standings

(*Continued from page* 88)

tributed by A-C to decreases in farm and construction machinery sales.

Wagner Electric Corp's third-quarter net income dropped 41% to $928,885 on an 8% sales decrease to $25,114,766; Copperweld Steel Co reported a net loss of $40,-443 on sales of $22,150,312.

On the other hand, Babcock & Wilcox Co's net income rose 58% in the third quarter, while sales rose 3%; Square D Co's net earnings increased 8% on 4% sales increase.

First nine-month figures for the following show declines: American Chain & Cable Co, Inc's income, 22% and sales 1.5%; Anaconda Wire & Cable Co's net income, 80%; Triangle Conduit & Cable Co, Inc's net income, 68%; and Combustion Engineering, Inc's sales and earnings, both 27%.

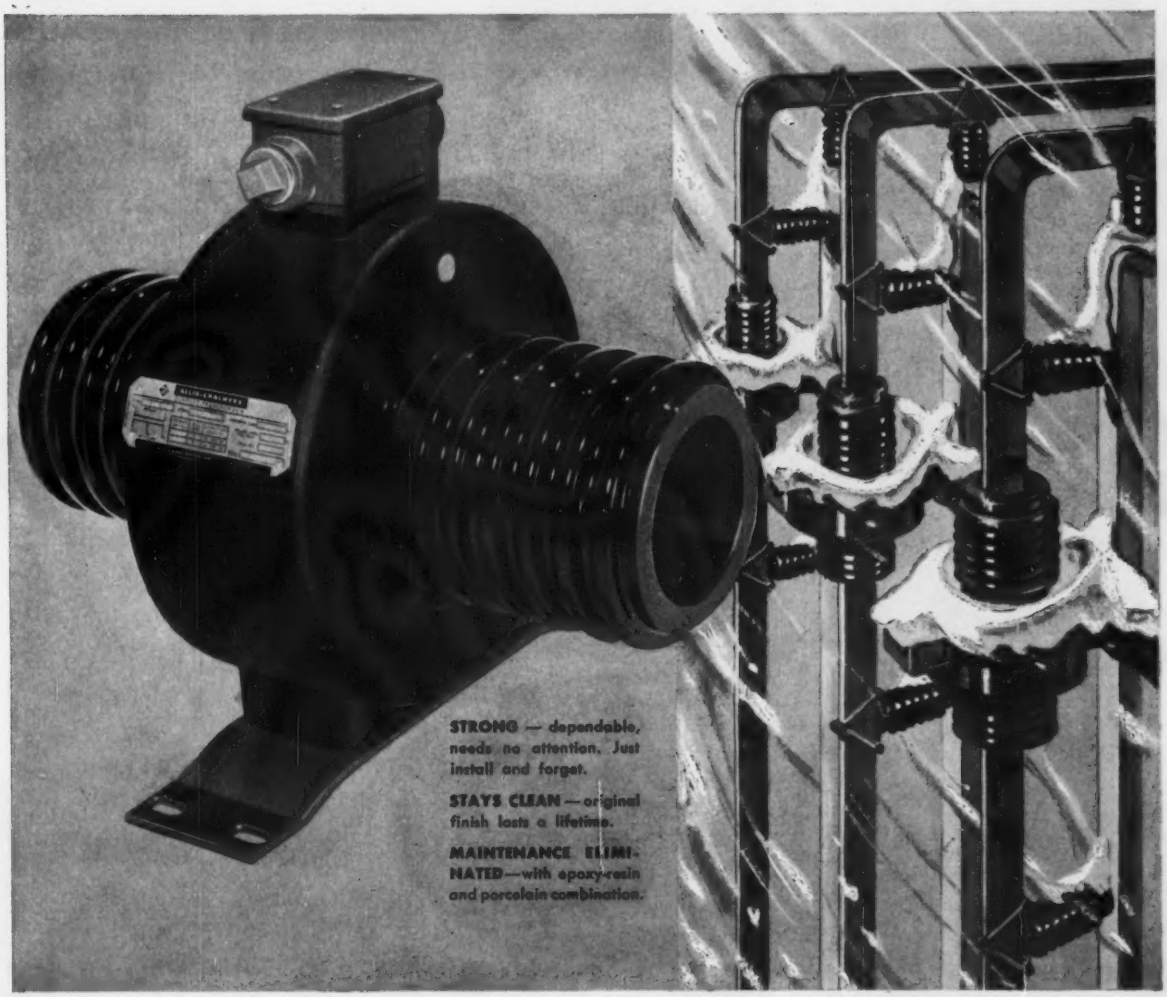
MANUFACTURERS BRIEFS

• **Federal Pacific Electric Co** has closed down its Keyser Valley plant near Scranton, Pa. Switchgear and bus duct manufacturing facilities were moved to plants in the area of N.Y.C.

• **Sierra Switchboard Co,** which makes low-voltage electrical switchgear and distribution equipment, has begun construction of a plant at Menlo Park, Calif. Besides the lighting panel and meter board production area, there will be five switchboard manufacturing areas, so that five major jobs may be underway simultaneously.

• India's governmental researchers have been joined by the British Electric Research Assn in looking into the use of windmills for electric power generation. Experimental windmills will be set up in barren, mountainous regions. An inexpensive bamboo and wood prototype, pumping up to 12,000 gal a day at 30¢ per gal, has already been set up, and first findings are being studied. In conjunction with its Indian subsidiary, **Garlick & Co,** the Australian firm of **Twoomba Foundry, Ltd,** is bidding on a 30,000-windmill construction project for India at $16-million initial outlay.

ALLIS-CHALMERS


STRONG — dependable, needs no attention. Just install and forget.
STAYS CLEAN — original finish lasts a lifetime.
MAINTENANCE ELIMINATED—with epoxy-resin and porcelain combination.

New from Allis-Chalmers! The first epoxy-porcelain transformer for

high current metering at 5 to 15 kv!

Latest development for heavy-duty high current metering service combines the excellent creep-flashover characteristics of porcelain plus the protective features of epoxy resin encapsulated transformer element. This epoxy-resin outdoor transformer marks the *first in its class,* for 5-kv, 8.7-kv and 15-kv — 1200 to 5000 amps.

The BKAW-M installs quickly and easily in any position. Superior-quality A-C epoxy-resin instrument transformers offer exceptional protection . . . withstand wide temperature variations, extreme mechanical shocks. Dielectric properties are excellent.

Allis-Chalmers constantly adds to this line of epoxy-resin outdoor and indoor transformers. Contact your nearby A-C office for details, or write to **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin. A-1384

ALLIS-CHALMERS CERTIFIED TEST REPORT — evidence provided in writing that your Allis-Chalmers transformer successfully passes all tests in accordance with ASA insulation and accuracy classifications.

TAKE ADVANTAGE OF THE BEST IN

LIGHTING PROGRESS

Street and Highway Lighting has come a long way from the first gas lamps. Joslyn reflects true progress in this field. The new Joslyn "400" Built-In-Ballast Mercury Luminaire incorporates night time efficiency with day time beauty...is the lightest in weight, the most compact in design, the most effectively streamlined for low wind resistance. Ask for Bulletin J2-116-A to obtain detailed information.

JOSLYN MFG. AND SUPPLY CO., 155 N. WACKER DRIVE, CHICAGO 6

Metering Transformer...

. . . combines epoxy and porcelain insulation. The window-type BKAW-M heavy-duty high-current unit has epoxy resin for insulation, support and housing of the transformer element and a porcelain sleeve to give flashover resistance as the primary conductor's insulation. The transformer can be mounted in any position. Ratings are 5, 8.7 and 15 kv, 1,000 to 4,000 amp.
Allis-Chalmers Mfg Co, Milwaukee 1, Wis.

Hot-Line Tool . . .

. . . is hydraulically operated from any 10,000 psi motor or foot-driven pump. The swivel head is mounted at a 45-deg angle to enable a lineman to work in the safest position with an unobstructed view of the dies. The hydraulic operating piston is at the bottom of the 7 ft-10 in. stick; thrust is transmitted by a fiberglass rod sealed within the fiberglass tube.
Aluminum Co of America, 1501 Alcoa Bldg, Pittsburgh 19, Pa.

Capacitor Units . . .

. . . rated 50 kvar are 15% lighter than their predecessors. They measure 4 in. wide and stand a maximum of 33½ in. high, with standard mounting dimension of 15⅝ in. Cooling features maintain low internal operating temperatures, and they are suitable for operation from -40C to 46C. Tanks are of stainless steel, bushings are solder sealed. They are furnished for 2.4 to 13.8 kv, 60 cps.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

(*More New Equipment on page* 94)

SUNSWITCH

Quality

THE NOT-SO-MAGIC INGREDIENT

Quality in a product is never an accident. It requires integrity and seasoned judgment, as well as industry. Attention to detail determines the difference between the ordinary and the outstanding.

Over the past 25 years, as pioneers of the automatic street lighting control, we've tried to make our business a "quality" operation . . . plus service. Result: a steady increase in sales year-in and year-out!

But, as a famous baseball pitcher once put it: "A fellow doesn't last long on what he has done. He's got to keep on delivering as he goes along."

We sincerely intend to keep delivering.

SunSwitch

RIPLEY COMPANY INC. MIDDLETOWN, CONN.

Electric Vehicle . . .

. . . for one person is designed for travel about the plant. It operates in 25-in. passageways at 5 or 11 mph forward and 5 mph in reverse. The Truckster can be equipped with two-way radio. It weighs 645 lb, can travel 40 miles on a charge and has built-in charging equipment that operates on 110 v ac.
Cushman Motors, Lincoln, Neb.

Valve Operator . . .

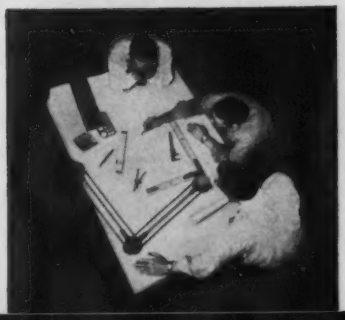
. . . with electric or air motor drive opens and closes large valves and operates sluice gates. The portable Pow-R-Drive, which weighs 38 lb, rotates at 20 rpm in either direction. A safety control stops the drive if it gets away from the operator.
E. H. Wachs Co, 1525 N Dayton St, Chicago 22, Ill.

Two-Way Radio . . .

. . . for mobile units and central station control points operates in the 150-174-Mc band. The G-150 cabinet is 5x12½x8½ in., so fits easily under the dashes of most

(*Continued on page* 98)

CONCENTRATION



DUAL VOLTAGE SAVES $15 OR MORE ON EVERY TRANSFORMER

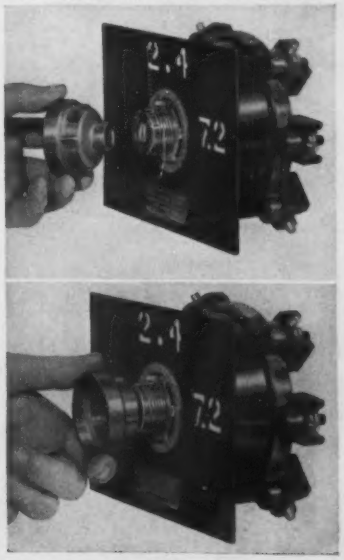
Concentration on one idea has resulted in the new RT&E thoroughly tested and reliable Extern-O-Switch. This redesigned dual voltage switch makes **dependable** cut-over of entire areas to higher voltage at savings of $15 or more per transformer.

Extern-O-Switch body is made of an entirely new compound — a specialized glass-reinforced Polyester thermoset material. It is highly shock resistant and actually extinguishes arcs passed over its surface. Impossible to track, its characteristics are not affected by transformer oil or heat. Electrical insulation levels are increased by 50% with this exceptional material.

The unique externally operated handle reduces changeover to a simple twist of the wrist. Key-type handle cannot be removed unless the switch is correctly positioned. Inside, high pressure contact is assured. New leaf springs behind each contact prevent metal fatigue and provide lasting, positive contact pressure.

RT&E's concentrated research program developed these improvements to reduce man hours and save money. Protect your investment, look to RT&E — originator of the dual voltage transformer and externally operated switch.

SAFE! Unique keying action between handle and slotted ring around shaft assures positive positioning before handle can be removed.



Engineering Talent Concentrated On One Idea — **A BETTER TRANSFORMER**

RT&E CORPORATION

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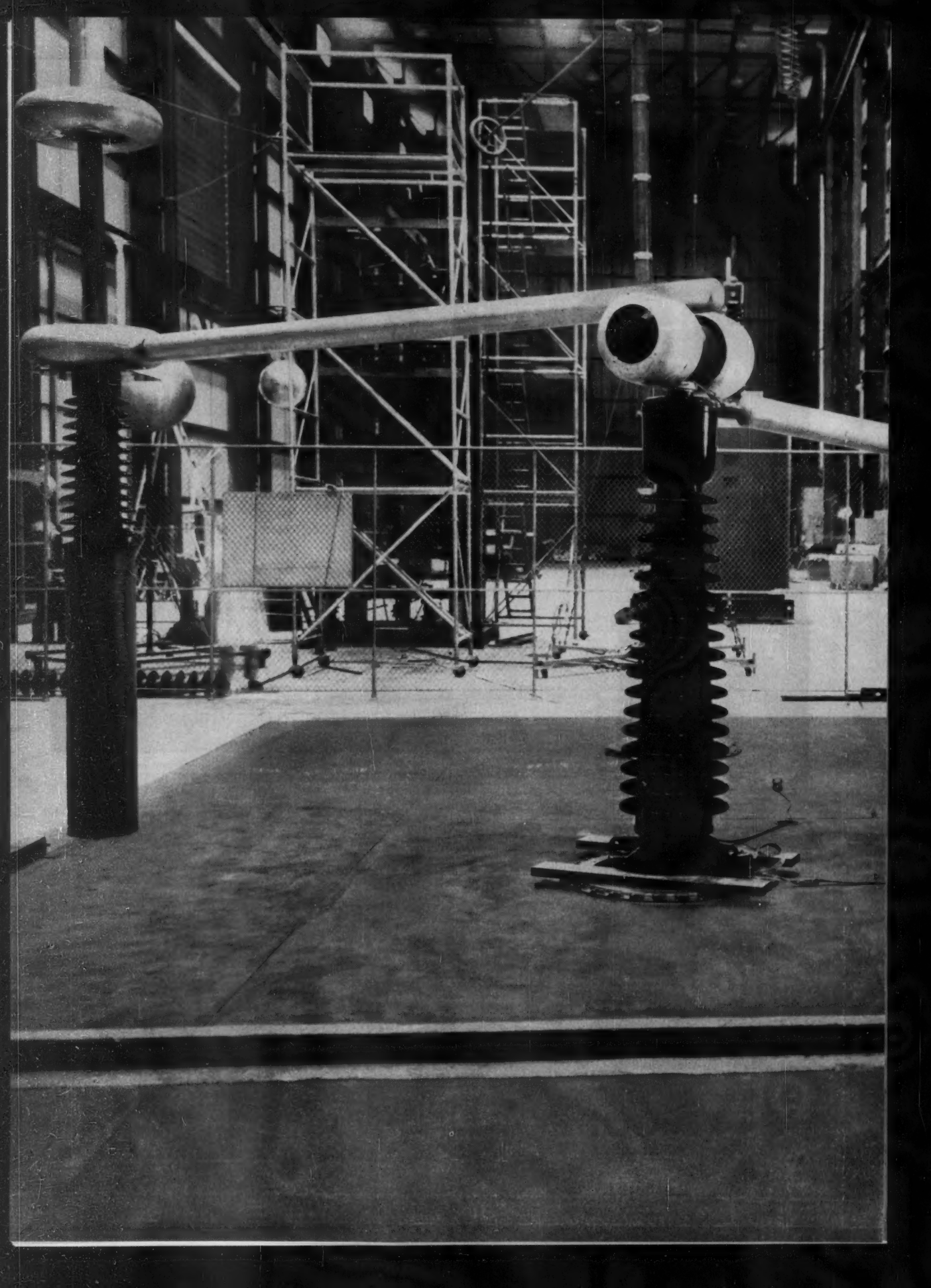

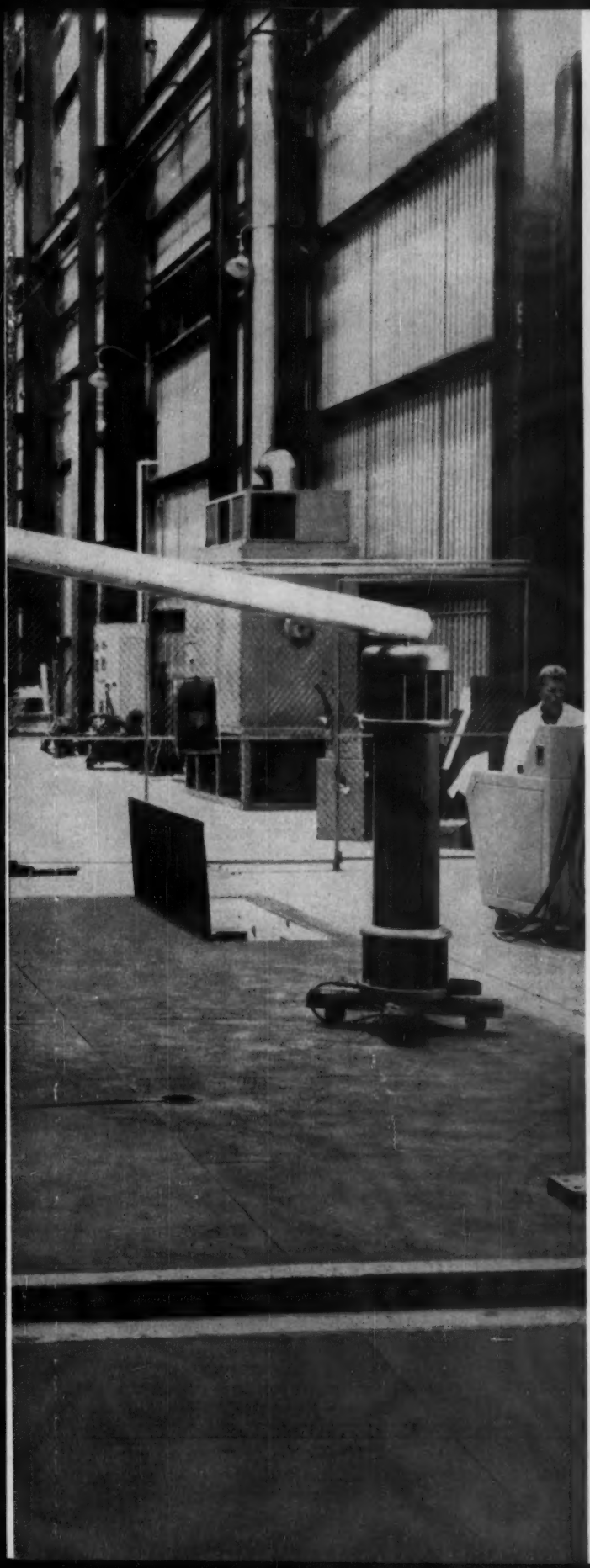

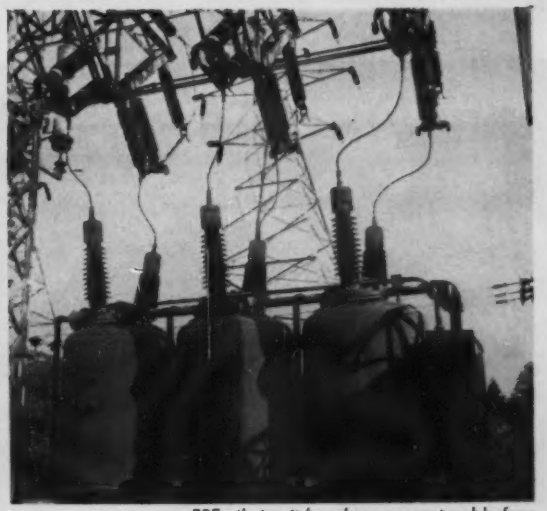

FPE oil circuit breakers assure trouble-free service at Niagara-Mohawk installations.

from an 85 ft. high test tube...come breakers and bushings with longer lives!

The high-voltage laboratory of Federal Pacific, towering almost ten stories above California's Santa Clara Valley, is dedicated to making the most advanced equipment *even better.* Here we design a full range of power circuit breakers and high-voltage entrance bushings . . . produce them in a large modern facility . . . run complete tests with as much as 2,000,000 volts applied. Federal Pacific's high-voltage laboratory, the largest and most completely equipped in the West, helps produce major improvements in performance. Proof: in 40 months of rugged service at Niagara-Mohawk's Lighthouse Hill installation in upstate New York, and after 45 automatic operations under fault conditions and 23 operations under load conditions, absolutely no contact maintenance has been required on Federal Pacific's Type RHE breakers. With 50 years of leadership in circuit breaker design and construction, you can expect performance like this from Federal Pacific—superior performance from exclusive features like the rotating contact structure, the only moving part in the tank, which provides six equal breaks in series per pole. For more information on laboratory-proven, reliable, low-maintenance FPE breakers, write for Bulletin 7223, Dept. FP-8, Federal Pacific Electric Company, Newark 1, N. J.

FEDERAL PACIFIC ELECTRIC COMPANY

FPE

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WEIGHT OF COATING TEST

...added assurance of dependability

The life of galvanized steel strand depends primarily upon the weight and quality of the zinc coating. The heavier the coating the longer the strand will last.

The wire used in CRAPO Galvanized Steel Strand is regularly subjected to the hydrochloric acid antimony chloride, or weight of coating, test. By means of this test the amount of zinc on the surface of the wire can be accurately measured.

This is but one of the many laboratory tests to assure consistently high, dependable quality in the finished product.

AVAILABLE IN 3 COATING WEIGHTS

CRAPO Steel Strand is regularly furnished in all standard sizes and grades and in Class A, B and C coatings. Class B coating is twice as heavy as Class A coating; Class C coating is three times as heavy.

Write for this FREE BOOKLET!

"The Story Behind CRAPO Galvanized Wire and Strand" describes and illustrates manufacturing and testing techniques. Ask for Booklet B-59!

STEEL & WIRE CO., INC.
Muncie, Indiana

Two-Way Radio . . .

(*Continued from page 94*)

vehicles. It contains an AM transmitter, receiver, power supply and loudspeaker. Input can be 6, 12, or 24 v dc for mobile units, 117 v ac for fixed stations.

Gonset Div, Young Spring & Wire Corp, 801 S Main St, Burbank, Calif.

Safety Switches . . .

. . . withstand 200,000-amp faults when used with high capacity current-limiting fuses. The enclosed type TH heavy duty and type THD heavy duty interrupter switches have ratings of 30 to 600 amp, 250 to 600 v ac.

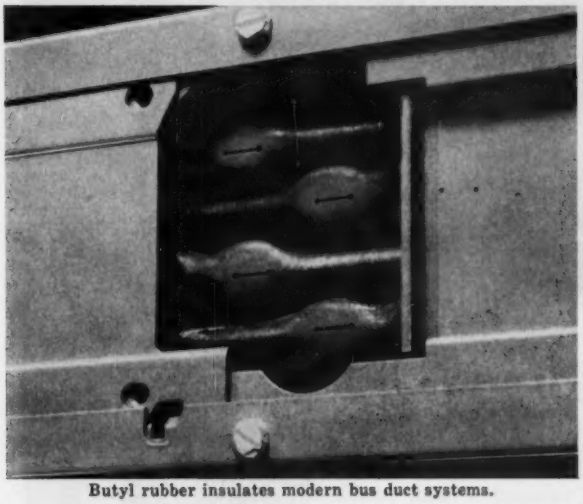
General Electric Co, Plainville, Conn.

Storage System . . .

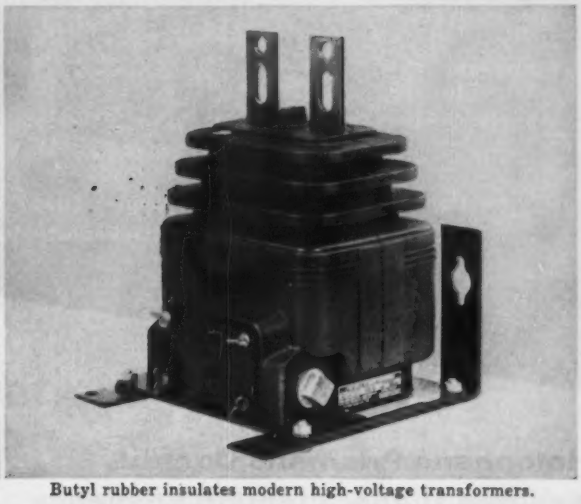
. . . comprises two magnetic drums capable of containing 24 million digits and signs. The Univac Randex storage system can be expanded to as many as ten drums. The memory unit operates on-line.

Remington Rand Div, Sperry Rand Corp, 315 Park Ave South, New York 10, N. Y.

Butyl rubber insulates modern high-voltage transmission lines.



Butyl rubber insulates modern bus duct systems.



Butyl rubber insulates modern high-voltage transformers.

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Enjay Butyl tops all vulcanizable rubbers in electrical and dielectric properties . . . in resistance to corona and ozone breakdown and water absorption. Its high dielectric strength insures against electric breakdown under normal or surge voltage. Its heat resistance permits higher current flow for a given conductor size. Butyl also offers outstanding resistance to weathering and sunlight . . . chemicals . . . abrasion, tear and flexing . . . superior damping properties ...unmatched impermeability to gases. Result? Butyl is ideal for wire and power cable, transformers, tapes, bus bars, and other insulation applications.

Find out how this versatile rubber can improve your product. Contact the nearest Enjay office. *Home Office:* 15 West 51st Street, New York 19, N.Y. *Other Offices:* Akron • Boston Charlotte • Chicago • Houston • Los Angeles • New Orleans • Plainfield, N. J. • Southfield, Mich. • Tulsa

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In cooperation with Line Material Engineers

The First Refractor of its Kind

Unprecedented in Size...in Performance

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For Lighting Wide Business or Shopping Streets... Uses
700-1000 W. Clear—or Phosphor Coated—Mercury Lamps.

Line Material
Luminaire

Holophane Prismatic Control Assures Higher Lighting Efficiency...

Line Material Luminaires Provide Modern Design

The trend to larger mercury lamps with greater lumen output has brought a critical need for more precise control of street lighting distribution... Holophane engineers, working with Line Material designers, have met this demand with the development of the new 4193 Refractor. Its unique "custom-tailored" prismatic construction provides these advantages: more useful light on the roadway, wide spread distribution, greater effective visibility distance, finest illumination per citizens' dollar... Line Material luminaires bring a new, modern look to the street scene...

DISTRIBUTION—IES Type III with clear lamps—IES Type IV with coated lamps... Low angle candlepower emission results in minimized veiling glare and maximum seeing comfort.

Write for Engineering Data

HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898

STREET LIGHTING DEPT., NEWARK, OHIO

THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 18, ONT.

Electrical World

NOVEMBER 14, 1960

Management Newsletter

Why a Company Publication?

Although the publication of company magazines has become a $135-million annual business, many companies are getting no return on this investment. Hundreds of the 10,000 or so published achieve no effect that has value to either management or the employees. Yet others, avidly read by employees, are regarded as highly effective by their publishers—management—and by outside authorities who have long experience in this field.

The big weakness of employee publications is lack of Purpose, according to 85 corporation executives surveyed by Dartnell Corp of Chicago. Those publications that are successful are put out by companies that have clearly delineated *Purposes* and aim all content of their publications at it.

The Purpose is easy to define: better employee relations. The effective company magazine aims to sell the employees on his company by showing him that the company's welfare is his welfare, too. To do this, it interprets company policies, explains its financial structure, describes its operations. It tells him of the company's plans and expansions. It spikes internal rumor and combats outside propaganda. It promotes his feeling of belonging, his appreciation of the benefits his company offers as a place to work, and his understanding of the company's side of problems.

These aims are recognized by capable industrial editors, the Dartnell survey found. Yet many company publications flounder, serving up chitchat, an occasional

feature story about a company party and the president's page in Victorian prose. The usual trouble is that management treats the magazine with little regard. The editor may have no experience in writing or publishing and have come into this job because he was a capable clerk deserving of promotion. Or perhaps he is trying to turn out the company magazine with one hand while working at another job—probably his primary one—with the other. And he seldom has any idea of what the aim of the publication is—or whether it even has one. This was a common situation back in the days when the house organ was called a house organ.

But with the obsolescence of that name, the better company publication has dropped the chitchat and picked up *Purpose*. It has gone professional—or at least its editor has. He is trained in his trade and probably has some previous experience in publishing. He is there because management has taken an interest in the company magazine, defined its *Purpose*, and offered him a generous salary to do one thing only. Moreover, he has a staff and a direct pipeline to top management.

He is a sharpshooter with the clearly delineated target of better employee relations. He has at his disposal a whole arsenal of editorial weapons and he knows how to use them. The adept industrial editor produces a company magazine that offers variety, that convinces and that has a professional appearance. He has to be good, for his publication competes with *Life, Readers Digest* and the newspapers for readership.

He also keeps in mind his aim. Like every good sharpshooter, the editor concentrates on his target and pays no attention to distractions. Anything that does not help achieve the *Purpose* goes by the board. If it won't motivate the employees to become better workers, it doesn't belong in the magazine.

Hence the exit of chitchat. Con Gebbie, New York consultant for company periodicals and editor of several, comments that "Chitchat can, at best, not offend." He points out that the female clerk whose 45th birthday is celebrated in print probably will not be pleased. The popular belief that names make news is not true, says Gebbie, unless the possessor of the name has done something really interesting—and, as far as it concerns the company publication, something that helps the *Purpose*. It is hard to see how anyone can be motivated to become a more effective worker by this item from a recent utility periodical: "A couple of of the boys are ribbed a bit about foreign car purchases. However, the bank accounts are increasing due to savings on gas, etc., etc., etc., etc., The ribber, incidentally, is the one and only 'Georgie.' "

Though many industrial editors have expunged chitchat from their pages, others see merit in some personals. "The one-line mention that 'John Jones just moved into his new home' is a good plug for the company and for capitalism," one editor believes. Other editors feel that the one-liner is too laconic for the average employee to get the point.

Stories Are Tailored to Readers

A full-page article about John Jones and his new home, on the other hand, is bound to make its point—if anyone reads it. For here, too, there is a pitfall. This time it is boredom for the reader. If the story doesn't touch something meaningful for him, he'll quit reading after the first two paragraphs. Perhaps Jones, whose paycheck and family are of average size in the company, built his own house. The implied "You can, too" here has meaning. But the fact that Jones is a shift engineer at the Seaside plant is not significant enough to rouse interest by itself. On the contrary, this connection is merely mentioned by the capable editor, for he is a low-pressure salesman.

The article about an employee or some feature of the company, nevertheless, is the backbone of the employee magazine. In a round-table discussion, 35 industrial editors told Dartnell's surveyors that the personals have worth. Each may run all the way from a paragraph to several pages. In the better company magazine, one or several—but not dozens—may run in an issue. There is usually at least one photo, with even the shortest article. But, again it belongs only if it is to the *Purpose* and interesting in itself, even to the employees who never heard of the fellow it's about.

Probably the most effective article, even though the most obviously aimed, is the one that fills a recognized need for information peculiar to the company's work force. Employees are intensely interested in the company's benefit plans, salaries, working conditions, plans for expansion and changes in top management. All these affect their futures. A lucid explanation of the employee life insurance plan, written by a staff man of the insurance company carrying the plan (and edited for style and clarity by the editor), will probably be read by every company employee—and his wife.

Editorials Have Impact

For most company publications today are aimed at the whole family. Many are mailed directly to the homes. And some of the pieces in them have no connection whatever with the companies. These general interest articles usually cover practical matters. The editor selects subjects that are sure to appeal to *his* readership. An article on the costs of putting a son or daughter through college is a sure thing for utility employees, because many of them have two decades or more service and this means teenagers in the family. Though there is no tie-in to the company, the employee cannot fail to realize that such an article is a service done him by his company's magazine. Moreover, general interest articles grind no axes, hence serve the *Purpose* indirectly by heightening credibility.

So do want ads. Editor Barbara Beach of Consolidated Edison Co of New York admits without reluctance that their cost-free want ads are the best-read columns of Con Ed's publication *Around the System*. Like want ads, letters to the editor are in every newspaper. But do they belong in the company publication? Apparently not, for few employee publications carry them. Editors say they rarely get letters more provocative than this one: "Why do our employees insist on sealing interdepartmental envelopes? Each envelope clearly says on it to tuck in the flap and drop in your outgoing box."

A widely recognized factor in stimulating readership of house organs is format. Utility companies, however, are divided on opinion about which presentation is better, the newspaper or the magazine format. The first is generally held to attract more quick readership, but, like a newspaper, it has the disadvantage that it does not invite rereading. The magazine-type house periodical, on the other hand, gets treated like a magazine. Dad finds it with the mail, glances through it and puts it on the living room table. But on Sunday he'll get deeper into it. To make Dad and the rest of the family want to read it, the editor has spent much of his budget on an attractive layout, with clear photos, striking display for the main story, color, and variety in appearance without hodgepodge.

How much of the magazine Dad or anyone else in the family remembers is another question. One readership survey showed that a healthy percentage of a company's employees had read the magazine from cover to cover and most of the rest had read over half. But when asked what they remembered about it, few could recall more than the subjects one or two articles had dealt with. The publication lacked impact. A growing school of thought maintains that, to gain impact, the

company publication must stop ignoring controversial issues. There is a full spectrum of views about how much opinion and what kind belongs on the pages. In their editorials, utility magazines, almost without exception, stick to non-controversial safety, which deserves regular and imaginative coverage, to public power, treated in some publications by an acridly worded syndicated column, and to praises of the American Way of Life. This last is probably superfluous. The employee has been imbued with the American way from birth, he understands it and he's in favor of it. Room for polemic here arises chiefly from the different feelings he and management have about business and unions.

But on unions, most company publications maintain silence, except for 100% factual news reporting on the results of wage negotiations. Union affairs, of course, go beyond wage talks and contracts, which seldom create enmity in the utility industry, anyway. High blood pressures are due, rather, to the different viewpoints that management and unions hold on Landrum-Griffin and right-to-work laws, on trends in labor-management relations in American industry, on grievance cases and on degrees of governmental regulation and participation in business. The company publications also decline to discuss such non-union matters as the pros and cons of rate affairs before public utilities commissions, pending or enacted legislation, politics and finances. Managements stick to their hands-off policy in spite of polls by Opinion Research Corp and others, who have found that employees believe company publications more than union organs.

Management Should Speak Up

Several reasons are popularly offered—and this is true in all industries—for abstaining from opinion. Some management people say that this would be propaganda and that one-sided opinion would subvert the magazine's credibility. Others prefer not to stir things up, to let sleeping dogs lie. The advocates of speaking up point out that the unions have already stirred things up, so there are no more sleeping dogs. C. J. Dover of General Electric Co asks what good there is in the credibility of chitchat and exhortations to teamwork. "Management silence is the Achilles heel of employee relations," he adds. "Management should be more forthright across the full range of issues which affect employee relations."

The Koppers Co has elected to meet the issues head-on. Former Koppers editor Robert Harper points out that "in many companies, we just haven't given employees a chance to hear both sides of the question and its about time we started to do it." An increasing number of companies are starting, but they still count only a handful.

To sum up, just what departments should a company publication include and what does it contribute to the *Purpose?*

The right kinds of personals form the backbone of reader interest. But chitchat is not only purposeless, it can be detrimental.

Information about the company, its plans, its benefit programs and anything that affects the employee is eagerly sought by him.

General interest articles, like one in putting a son through college, don't grind the company's ax, hence aid credibility.

Free want ads do too, and they may turn out to be the best-read department.

Editorials can convince when they stimulate, and they stimulate only when they deal with live issues.

An attractive format draws readers, too. But the finest layout cannot make up for poor content. Nor does merely amusing the reader serve the *Purpose.* The editor succeeds who combines interesting writing, which gains readers, with meaningful coverage, which gains the objectives.

WESTINGHOUSE POWERCASTING* predicts super-capacity plants...demanding automatic operation

Load growth is accelerating. To meet demands, utilities will continue to add generation capacity in ever larger units. Accompanying the super-capacity of equipment is its increasing complexity, far greater instrumentation, mounting need for reliability.

To control this massive, and expensive, facility efficiently or even adequately is fast approaching the limits of human ability. Emergency conditions bring the problem into critical focus. Operating variables throughout a typical station number in the hundreds. It is virtually impossible for personnel to assimilate all necessary data, to analyze and translate it quickly into the best course of action. Hurried decisions based on hasty scanning of complex interrelationships by operators under great stress make the possibility of major equipment damage a constant threat. Records indicate that chances are one in three a major accident will occur in the lifetime of your plant.

The cost of a single major outage due to operator error can easily exceed the total cost of a completely automatic control system. The automatic steam plant is coming because it must . . . to make your huge capital investment in generation operationally economical, reliable, safe for men and equipment.

*A Service-Mark of Westinghouse

Westinghouse

WESTINGHOUSE POWERCASTING*

Westinghouse program of product development concentrates on automatic power plant

Prodac† means PROgrammed Digital Automatic Control. It is a high-speed computer designed specifically for steam station system control. Here are just a few of the unique services Prodac can perform for you.

Special logic unit and priority director simplify and expedite the making of thousands of decisions required for sequencing and control of a generating unit. Sequencing changes are made automatically whenever needed to start up, shut down or run at maximum efficiency under either normal or emergency conditions.

Prodac rapidly and continually scans and logs all necessary system variables, keeps up-to-the-minute records. By extensive calculations, this information is presented in meaningful heat rates and unit efficiencies. After analysis, required changes are made automatically to optimize performance of the entire plant.

All sub-loop control systems for the turbine-generator, boiler, fuel, feedwater, and all other plant systems are completely coordinated and integrated in Prodac.

Plant reliability is greatly improved with special stored programs with which Prodac can at any time take high-speed corrective action, under both normal and emergency conditions. Operator error has been designed out.

Availability of each turbine unit is significantly increased by reducing start-up time, cutting down time. Maintenance is cut appreciably . . . plant equipment limits are not exceeded.

Manpower requirements are reduced because of the computer's ability to observe and interpret large

quantities of data, and to perform a multitude of control functions . . . unattended.

Because of Prodac's high speed, immense capacity and many exclusive functions, these and other rewards are available to you from Westinghouse.

Turbine and generator section

New sub-loop controls equip Westinghouse turbine-generators for automation.

These new devices and subcontrol loops are necessary to adapt the turbine-generator for control by digital computer.

A wide-speed range governor, utilizing a magnetic pickup and static control equipment, has been developed for use during turbine-generator start-up. It controls shaft speed to the value dictated by the computer start-up program.

The automatic turning gear automatically engages the gear and starts the motor when the rotor comes to rest. The "at rest" condition is detected by a hydraulic zero speed indicating device.

The lube oil, seal oil and hydrogen systems are equipped for complete automatic operation.

A capability curve regulator has been developed to assure that the generator always operates within the capability curve of the generator.

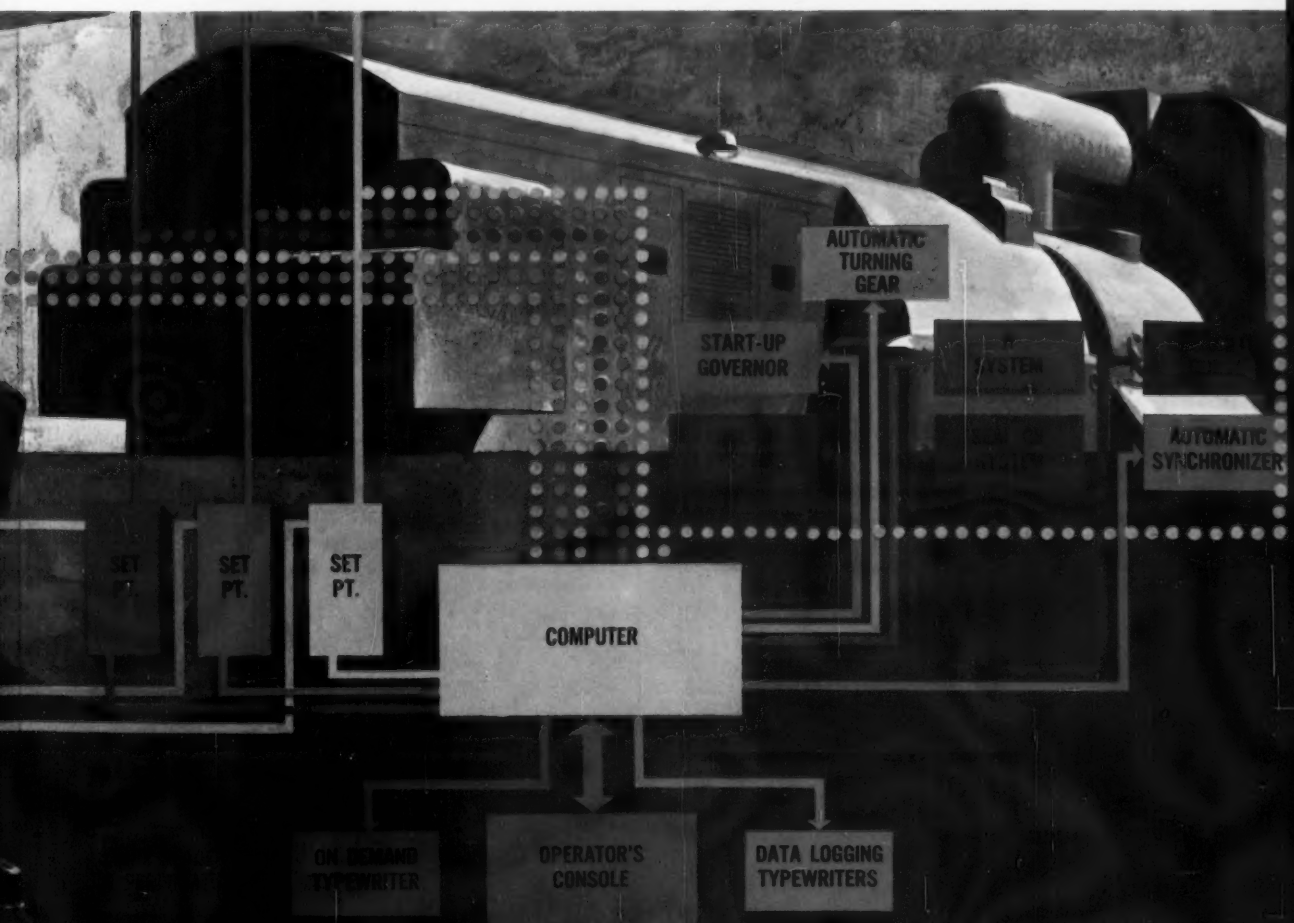
Westinghouse Powercasting can help you plan your system's future

Today, some utilities are faced with the immediate prospect of purchasing an automatic plant. You may be one of them. Whether or not you can make a decision now or any time may depend heavily upon the predictive and planning techniques available to you.

Westinghouse has developed a fundamentally new technique of total system planning . . . Powercasting. With the growing complexity of today's utility system, conventional planning methods just won't provide the answers fully or precisely enough. Therefore, Powercasting offers you a new way to create a plan, together with total capital investment needs, projected for the next 20 years.

*A Service-Mark of Westinghouse
†Trade-Mark

Westinghouse



Public Service with Westinghouse to automate its largest generating unit

Electric utility seeks today's ultimate in reliability—Westinghouse will engineer, furnish and coordinate the computer for automatic control on the Sewaren Generating Station Unit No. 5 for Public Service Electric and Gas Company of New Jersey. On-line target date —early 1962. On order—a 342,000-kw cross-compound turbine-generator and the new Prodac computer-control system.

This new unit will be more reliable than any conventionally controlled plant. Computer-control will provide greater reliability because it permits careful pre-programming of all normal and emergency operating procedures—precise, rapid supervision of incoming signals from hundreds of sensitive detectors—nearly instantaneous, multiple control of all critical power plant apparatus—anticipation and prediction of critical events before they occur, in time for corrective action.

The Westinghouse Prodac to be installed is the first industrial process computer-control using the unique new priority director to simplify the program, increase the operating speed and more efficiently utilize the memory capacity.

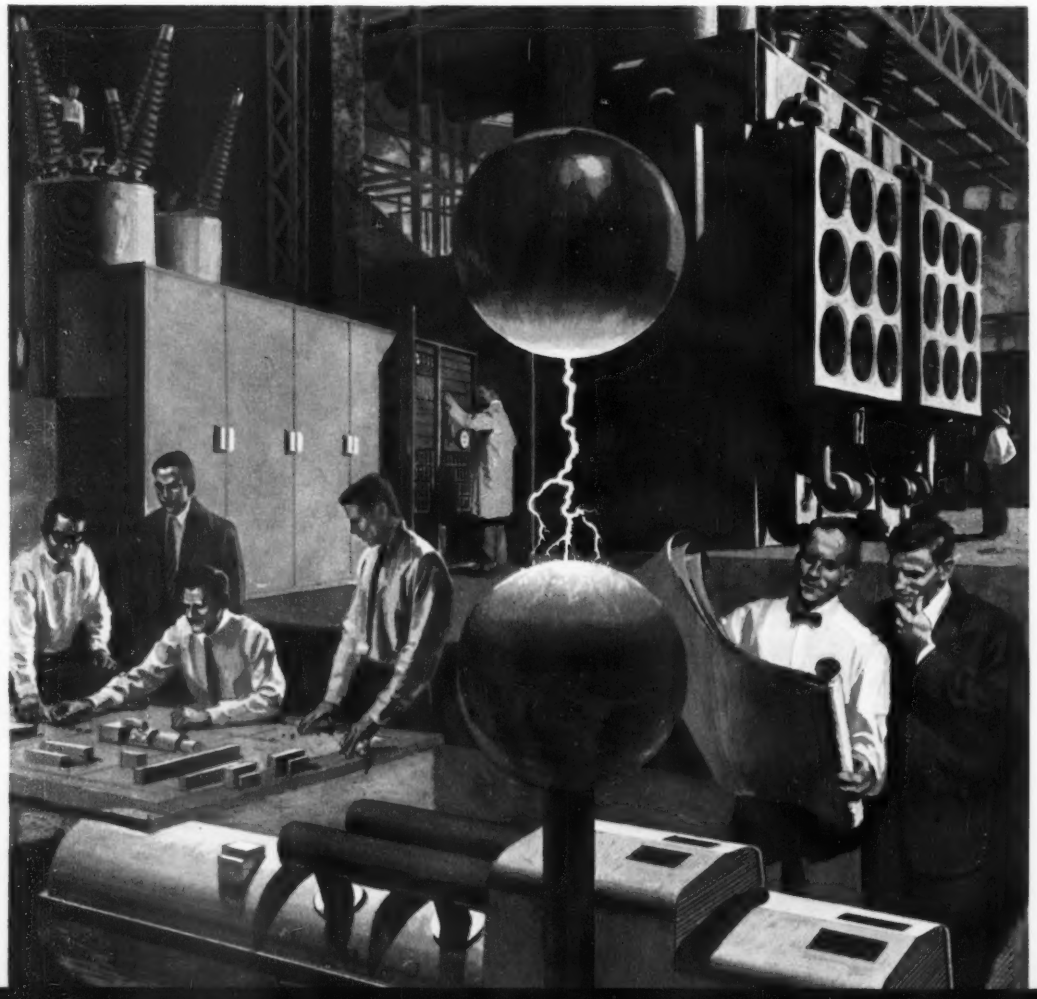
Westinghouse experience in the special problems and objectives of the electric utility industry is broad and deep. The men in Westinghouse, having this important experience capability, will use the most advanced analytical engineering and research facilities to help Public Service be certain that all aspects of this important project have been properly coordinated.

You can be sure . . . if it's Westinghouse.

Westinghouse

CP-1059

Litho in U.S.A.



Mexico Plans Giant Development

New TVA-like commission will be created to spur development of large depressed region in south-central Mexico

Mexico's congress will soon put approval on a new law which creates, officially, the Balsas River Basin Commission. "Its sort of like a bigger edition of your (US) TVA," a Mexican hydroelectric engineer told *Electrical World* reporters.

This project will be the biggest of its kind in Latin America with eventual 2.4-million kw installed electric generation capacity and production of 13-billion kilowatt hours per year. The natural rain and river basin covers an area of 112,-000 sq kilometers, 8% of Mexico's topography. The Balsas River forms the heart of the rivers system. Total population in the area is 4.5-million (Mexico's total population is 34.5-million) living in 5,000 towns and villages. Out of these 5,000 towns and villages, according to engineer Cuauhtemoc Cardenas, in the Commission's overall planning, only 414 have any electricity.

Area Is in Sierra Madre Range

The area is one of Mexico's most underdeveloped and lies principally in a rugged mountain chain, the Sierra Madre Range. About 80% of the people in the area do not have electricity. The Basin has already some 500 Mw installed capacity, mostly hydroelectric dams. Some 80% of this production is taken up by Mexico City via the Federal Electric Commission and the Miguel Aleman System. Some comes from two dams on the Tepacaltepec System.

Here are the dams and plants in construction and those projected for the future:

In construction—the big Infiernillo Dam, which will have 600 Mw installed capacity in four units, and which will straddle the Balsas River. This dam was started earlier this year. It is 448 ft high and 1,689 ft long. Width of the dam at the top is 32.8 ft. Design was made by some 200 Mexican engineers in the Federal Electric Commission headed by FEC's assistant director, Fernando Hiriart. It is an earthfill dam with volume of 4,200 acre-ft. Work is expected to be completed in 1964 and a lake reservoir formed covering about 131 square miles, containing approximately 569,000 acre-ft of water, it will be Mexico's largest lake—artificial or natural.

Projected for construction by end of 1962 are Salto Escondido, La Villita, and El Caracol. The projects will probably be put into construction in that order.

Salto Escondido will generate 30 Mw and is on the Cupatitzio River, which is part of the old Tepalcatepec System. Surveying is being done now on this job.

La Villita will generate 130 Mw on Balsas River and El Caracol will have 278 Mw also on the Balsas River.

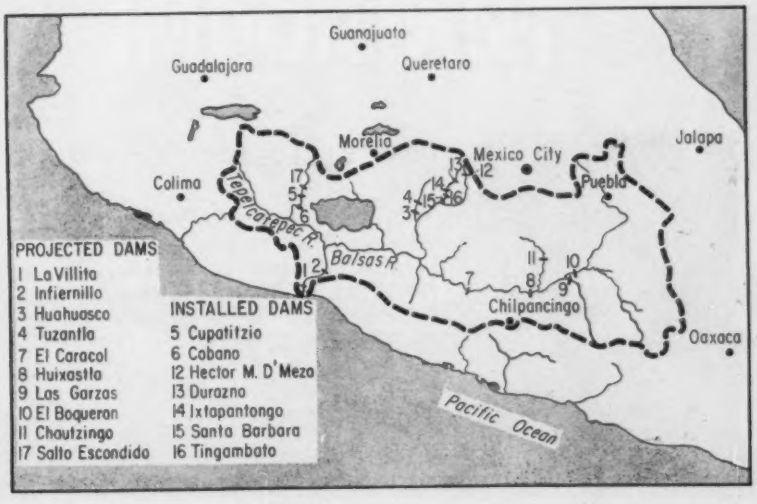
Long term projects that might get started within the next 10 to 12 years, with most being finished by the end of the 1970s are: Huixastla, 171 Mw on the Balsas River; Las Garzas, 42 Mw on Atoyac River; El Boqueron, 36 Mw on Atoyac River; Chautzingo 65 Mw on Amacuzac River; Huahuasco 63,000 kw on Tilostoc River; Tuzantla, 49 Mw on Tuzantla River. There are some other minor projects coupled with these which made the total come to a planned 2.4-million kw installed capacity—all hydroelectric. Infiernillo is the only one now under construction.

The whole plan will be administered by the Balsas River Basin Commission with its probable head being Gen Lazaro Cardenas. Cardenas' son, Cuauhtemoc, heads the planning department. Congress will make a new law legally forming the Commission which will work in conjunction with the Hydraulic Resources Ministry and the Federal Electric Commission.

The Balsas Commission will work not only on electric power but on developing the whole backward area. It will have some of its dams being used for irrigation for agriculture and will promote farming and industry. The area is rich in minerals (iron, gold, silver, lead, zinc, copper) but has been hardly touched. When Cardenas was head of the now superseded Tepecaltepec Commission in Michoacan State, a study was ordered from Germany's Krupp Works to determine the feasibility of an iron, steel and electricity compound built around the powerful rivers. Mexico's Altos Hornos steel company has also made an optimistic survey of the iron and steel possibilities in the Balsas River Basin.

The river flows are good, especially the Balsas. Dams are being built and power plants calculated for minimum flows. Even so, part of the area is experiencing a drought

(*Continued on page* 124)



New VP Posts Go to Gruhl, Schmidtman

Wisconsin Electric Power Co has promoted Alfred Gruhl to executive vice president. E. H. Schmidtman has been made a vice president.

In the absence of both the chairman of the board and the president, Gruhl will be top ranking officer.

Gruhl, who moves up to vice president, joined the company in 1932. He became a research engineer in 1944, and assistant vice president in 1948. In 1955 he was elected vice president and in 1959 was made a member of the board of directors.

He is also a vice president and member of the board of directors of Wisconsin Michigan Power Co, and Wisconsin Natural Gas Co, subsidiaries of Wisconsin Electric Power. He is a past president of the Wisconsin Utilities Assn.

Schmidtman has been with Wisconsin Electric Power since 1926. In 1941 he was named assistant research engineer, and research engineer in 1948. He was appointed assistant vice president in 1955, the post he held until being made a vice president.

He is also a past president of the Wisconsin section of the American Society of Civil Engineers.

GRUHL SCHMIDTMAN

California–Pacific Utilities Elects Hanson a Vice President

Earl A. Hanson has been elected a vice president of California-Pacific Utilities Co. In addition to his new assignment, Hanson will also be manager of the company's Southern Utah Division, with headquarters in Cedar City, Utah.

Prior to his transfer to Utah, Hanson was manager of the company's Lassen Division in Northern California.

He has had over 25 years of utility engineering and operating experience.

A graduate electrical engineer of the University of Minnesota, he is a registered professional engineer in Oregon and an associate member of the American Institute of Electrical Engineers.

He succeeds Ralph R. Thomas who will retire December 31.

EARL A. HANSON ▶

Niemi Elected VP-Manufacturing

Robert A. Niemi has been elected vice president-manufacturing of Combustion Engineering Inc.

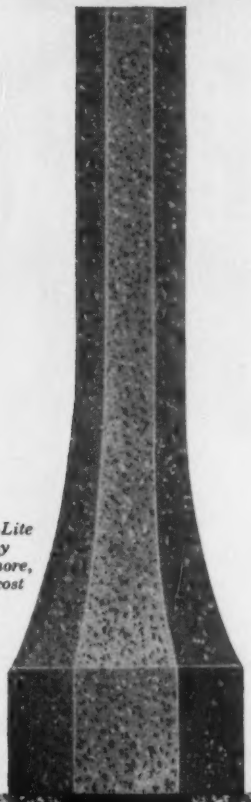
In his new position he will have full executive responsibility for manufacturing, purchasing, production planning and industrial engineering.

He will make his headquarters in the company's general offices at Windsor, Connecticut.

Before his recent promotion he was director of manufacturing.

◀ ROBERT A. NIEMI

(*More News About People on page* 112)



Although Hy-Lite standards may cost a little more, the installed cost is much less.

• Is street lighting in your planning? If so, you will want to consider *all* costs, not just the price of the lighting standard itself.

With Hy-Lite Stress-Spun standards, the money difference is easily proved by the lower cost of installation, plus the added savings of maintenance-free service.

The precast butt foundation design of Hy-Lite standards eliminates all need for expensive, time-consuming "cast in the field" foundationing. Just drill, set, tamp and Hy-Lites are completely installed, ready for wiring.

Add up *all* the money and maintenance saving advantages and we believe you will want to know more about attractive Hy-Lite lighting standards. Write the American Concrete Corporation, 5092 North Kimberly Avenue, Chicago 30, Illinois.

IT'S THE "IN GROUND" COST THAT'S REALLY IMPORTANT

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STRESS-SPUN CONCRETE LIGHTING STANDARDS

*Trademark

"Superforms* help us clip in transmission lines Better, Faster, for Less" ...CONTRACTOR

"When we bid on a T&D job, we have to figure *cost, speed, quality* and a *fair profit*. Since we started using Superforms, we've eliminated many former errors and inconsistencies in practices.

"We stake our reputation on results . . . Fanner products help us get best results."

Successful Contractors are the men who can build TOP quality at LOW cost. From coast to coast they are switching to Fanner Superforms. A-1604A

FANNER Superformed with a "PROTECTIVE TWIST"

ARMOR RODS... Protect long-span T&D lines at supports

LINEGUARDS... Protect short-span T&D lines at supports

PATCH RODS... Repair damaged conductors

TAP ARMOR... Protects conductor at tapping points

FANNGRIPS... For dead-ending strands and conductors

FANNSPLICES... Join two ends of conductor wire

PLASTIC PRODUCTS... For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

Thompson Named Square D Sales Manager

Ray W. Thompson has been appointed general sales manager, marketing division, of Square D Co. In his new capacity he will spend most of his time in field contact, acting as liaison between headquarters and Square D's various sales regions.

Thompson has been serving as Midwestern region manager during the past year. Kurt Morris replaces him in that capacity. Morris was formerly merchandise sales manager in charge of regional warehouses.

Foster Wheeler Names Ebsen Sales Manager

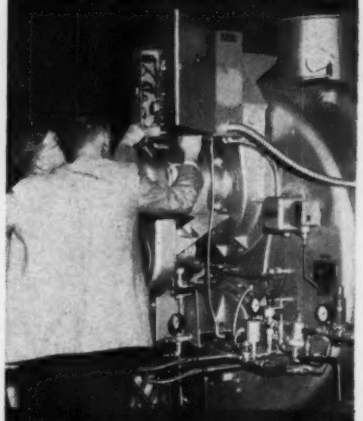
Charles F. Ebsen has been named general sales manager of Foster Wheeler Corp.

Formerly manager of process plants sales, Ebsen has served in varied sales capacities for the past 11 years.

(*More News About People, p* 114)

CONSIDER YOUR FUTURE IN

POWER GENERATION



Transformer capacities up to 400,000-KVA . . . Nuclear Reactors . . . Once-Through Boilers to handle higher pressures—all point to one thing: the demand for even better power equipment. Record economic forecasts mean even greater responsibilities and demands on the men who will grow with the power boom.

Keeping up-to-date with the latest developments provides you with the information you need to know to grow. That's why the Power Show is so vitally important to you. There you will see up-to-the-minute developments in hundreds of power specialties widely used in the power industry.

Only at the Show will you have the opportunity to investigate, compare, and get the right answers, face-to-face, from the manufacturers themselves. At the Power Show you'll see more than 250 suppliers' products, all conveniently grouped together.

Make sure you're there. Everyone else will be!

2522

24th NATIONAL EXPOSITION OF POWER & MECHANICAL ENGINEERING

AUSPICES ASME

NEW YORK COLISEUM

NOV. 28—DEC. 2, 1960

MANAGEMENT: INTERNATIONAL EXPOSITION COMPANY
480 Lexington Ave., New York 17, N. Y.

Will all your lights go on tonight?

For dependable, night-after-night performance...

LAMPLIGHTER —the photoelectric lighting control that offers every industry need in one unit!

Lamplighter Series 15,000 is new. Already acceptance by leading utilities has been high. Why? Lamplighter sets a new standard in photoelectric lighting controls, was engineered —

TO COST LESS. Lamplighter is low in cost . . . low in maintenance.

TO ELIMINATE REPLACEMENT PROBLEMS. Lamplighter's sensitivity adjustment, accessible from the outside, cuts replacement needs if you should raise light intensities in the future.

TO REDUCE BURNING HOURS. Low turn-on, turn-off ratio assures that burning hours are kept to strict minimum.

TO PROTECT AGAINST SHORTS. Superior surge and fuse protection help prevent damage in case of a short or overload.

TO PROTECT LINEMEN. Plastic cover and base provide high dielectric strength.

TO STOP CUSTOMER COMPLAINTS. More-than-adequate time delay prevents turn-off from intermittent lights. Close factory calibration assures dependable, night-after-night performance of all your street lights.

Lamplighter is adjustable from 1 to 10 ft-c., is fail-safe and completely weatherproof. Twist lock base fits all EEI-NEMA Standard receptacles. For easy adaptability, The Acme Wire Company also manufactures a complete line of accessories to meet many mounting requirements.

Write for detailed data.

The Acme Wire Co.
Utility Products Division, Dept. MP-1a
New Haven 14, Connecticut

Properly Designed
COOLING RADIATORS

TRANSFORMER TANKS to Specification

Shaw-Perkins Cooling Radiators are available in a complete range of sizes and models, to give any make and capacity of transformer all the efficiencies of thermosiphon self-cooling. They feature full length oval tubes for optimum heat dissipation, free flow. Flanges, elbows, valves, and other accessories available for any mounting condition.

Transformer tanks, another specialized Shaw-Perkins service to the industry, are engineered and built to customer specification, from pole mounted distribution types to power transformer types up to 3750 KVA.

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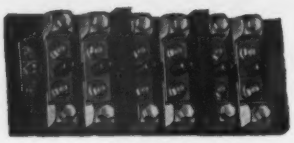
Look to Superior for
TEST SWITCHES AND BLOCKS



Test Block

Test Switch

Superior also offers a complete line of
Enclosures
Socket Equipment

Catalog 55 offers complete information on features, services, type and sizes. Write to:

SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON, OHIO
A subsidiary of
The Union Metal Manufacturing Company

PERSONAL BRIEFS

The following promotions have been made at Public Service Electric & Gas Co: **Arthur W. Gothberg,** former senior engineer, to substation engineer—general office; **Winthrop E. Mange Jr,** former Passaic division substation engineer, to senior engineer-general office; and **Edward L. Harris,** former engineer—general office, to Passaic division substation engineer. **Wilbert Bakker** became division service engineer, Hudson division, and **Walter H. Lohmann,** former engineer—general office, was named senior engineer—general office. Appointed division service engineers were **Elmer Torre,** Bergen division; **Robert L. Shepherd,** Camden area; **Kenneth G. Limmer,** Elizabeth; **William J. Hauze Jr,** Essex; **Warren L. Meyer,** New Brunswick; **Alvar E. Aronson,** Passaic; and **Warren E. Beck,** Trenton.

Managing director of the newly-expanded Electric League of Southern California in Los Angeles is **Mel G. Kennedy.**

Al W. Hardin has been promoted to director, residential sales of Mississippi Power & Light Co.

S. R. Finley, general superintendent of the Electric Power Board of Chattanooga, has become general manager of the board's activities.

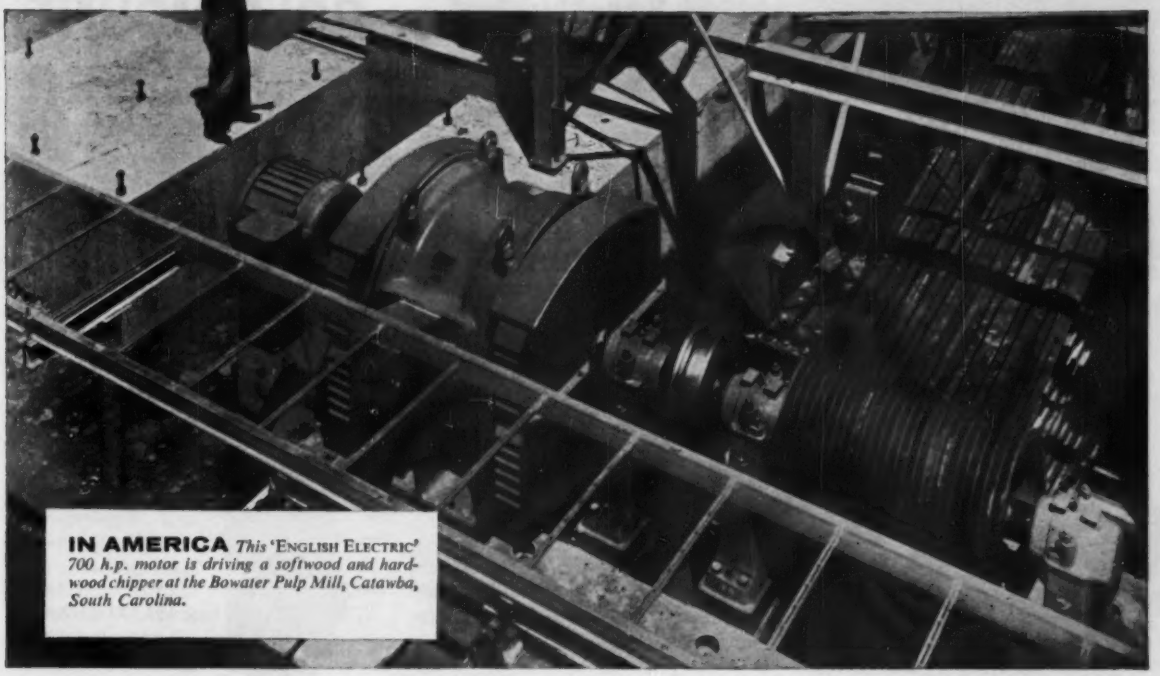
Savannah Electric & Power Co has promoted **Winfield C. Smith** to assistant superintendent of transmission and distribution, succeeding **Daryl E. Gaiennie** who resigned, and Smith has been replaced as distribution engineer by **John Spivey.**

Carl T. Mills has become an executive assistant at Iowa Southern Utilities Co.

Washington Water Power Co has made the following personnel changes: **Virgil N. Thompson** has succeeded **L. R. Wood** who retired as manager of the Coeur d'Alene (Idaho) division; **John B. Murray** took Thompson's place as manager of the Palouse division at Pullman, Wash.; **Loris A. Winn** became Big

(*Continued on page* 116)

"Start her rolling!"



IN AMERICA *This* 'ENGLISH ELECTRIC' *700 h.p. motor is driving a softwood and hardwood chipper at the Bowater Pulp Mill, Catawba, South Carolina.*

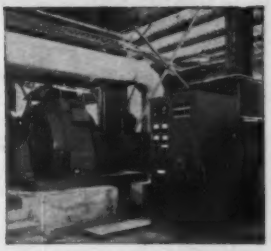
Throughout the world new 'wheels' of commerce start rolling. At Catawba, near Rock Hill, South Carolina is the latest pulp mill of the Bowater organisation. Here 400 tons of sulphate pulp (the valuable strengthening element in most forms of paper) is produced from each day's consumption of 800 cords of pine.

Drive motors for use in various processes were supplied by 'ENGLISH ELECTRIC'. These motors range from 250 to 1,000 h.p. and are used for driving pumps, fans and chippers.

Motors, designed and manufactured by 'ENGLISH ELECTRIC' ranging from 68,000 h.p. wind tunnel compressor motors to fractionals for domestic appliances, serve industry, commerce and the home in almost every country of the world. Wherever power is used or needed 'ENGLISH ELECTRIC' is ready to generate it, distribute it and put it to use. Work on any location is backed by a worldwide organisation with factories in five continents.

IN THE PHILIPPINES

An 'ENGLISH ELECTRIC' *1,320 h.p. synchronous induction motor and control cubicles driving a ball mill at the Republic Cement Corporation Plant, Manilla.*



IN SOUTH AFRICA

Six of the 44 'ENGLISH ELECTRIC' *2,100 h.p. salient pole synchronous motors driving water drainage pumps 5,400 feet below ground in a South African Gold Mine.*

'ENGLISH ELECTRIC'

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Sub Agents:—

James I. Metcalf & Co. Inc.,	Room 704, 1411 Fourth Avenue, Seattle 1, Washington. Branch office in Portland, for Washington and Oregon.
Electron Equipment Co. Inc.,	2418, Calhoun Street, New Orleans, 18, Louisiana, for Louisiana and Mississippi.
Osgood & Associates, Inc.	988, Spring Street, N.W., P.O. Box 7383, Station C, Atlanta, Georgia, for Georgia, Alabama, Tennessee and South Carolina.
Peabody Brothers.,	2903 St. Louis Street, at Oakland, Dallas 26, Texas. Branch offices in Houston and Tulsa, for Texas, Oklahoma, Arkansas and New Mexico.
Flagg, Brackett & Durgin, Inc.,	183 Essex Street, Boston 11, Massachusetts, for Massachusetts, Rhode Island, Maine, New Hampshire and Vermont.
Charles R. Lee & Associates, Inc.,	3796 West Flagler Street, Miami 44, Florida, for Southern Florida.

SERVICE FACILITIES ARE AVAILABLE THROUGH THREE LARGE CANADIAN PLANTS

Prevent pole failure

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POL-NU

This patented formulation of Pentachlorophenol was developed for groundline treatment of standing poles and has these three superior characteristics:

- Grease consistency . . . adheres readily to standing poles; stable to temperature and storage allowing precision machine application.
- Deep penetration . . . assured through use of an oil selected from over 200 tested; oil meets American Wood Preservers' Association specifications.
- Long life . . . through use of Pentachlorophenol preservative of proven stability; Pol-Nu is not water soluble, won't leach out of treated poles.

POL-NU BANDAGE-MAKER, designed for use with Pol-Nu, cuts costs and speeds application of ground-line treatment to standing poles.

POL-NU PAK is factory-sealed, ready-to-use pole bandage. May be applied instantly by maintenance crews. Easy to stock and handle.

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Leading manufacturer of wood preservatives
MEMPHIS 1, TENNESSEE
Palo Alto, Cal. • Portland, Ore.
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Chapman Chemical Company
P. O. Box 138, Memphis 1, Tenn.
Please send your folder, "Preventive Maintenance For Poles," to:

Name_____

Company_____

Address_____

Bend division manager; **Robert T. Paine** moved to Moscow, Idaho, as district manager there; and **P. J. Blanchard** became district manager in Colville, Wash.

William Webster has been appointed chief executive officer of the New England Electric System, succeeding **Irwin L. Moore** who resigned the position but continues as board chairman. **Herbert R. Waite** has become public information director in Boston for the System, replacing **William J. Cadigan** who became assistant to the president of the affiliated Worcester County Electric Co. **John F. Eichorn** became power sales manager of the Lowell Electric Light Co and Merrimack-Essex Electric Co. **William A Sherman** and **Edward F. Dillard** are now power sales engineers for the System in Boston, and **Fenton W. Varney** is in Providence, R. I., as assistant power sales manager.

Joseph P. Healey, vice president and general counsel of Boston Edison Co, has been elected to the company's board of directors.

At Carolina Power & Light Co, exline foreman **Carl Teague** has succeeded **A. P. Wright** as line supervisor, directing line work in the Asheville area. Wright became a consultant. Lineman **C. Thad Blaine** was promoted to line foreman.

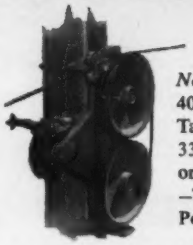
Four promotions have occurred at South Carolina Electric & Gas Co: **Malcolm C. Johnson,** superintendent of transmission; **Virgil C. Summer,** superintendent of production; **John P. Connolly,** superintendent of McMeekin steam electric generating station; and **Franz D. Wessel Jr,** assistant superintendent of McMeekin Station.

Saxon B. Palmer has been appointed superintendent of construction for Jersey Central Power & light and New Jersey Power & Light Companies.

T. J. Cope Division, Rome Cable Corp, has named **W. H. Korb** assistant sales manager.

F. Stan Romanse has been appointed division purchasing agent of Babcock & Wilcox Co's boiler divi-

NEW PENGO POLE-MOUNT TENSIONER



*Now...*PENGO 4000 Tensioner Takes Conductor to 336,500 cm-ACSR or 397,500 cm-AAC —Tensions to 1,000 Pounds!

Here's a bullwheel tensioner you can carry in every line truck! It features two 18 inch neoprene lined bullwheels. Tru-Stop disc brake — yet weighs so little it's truly portable.

Two men can easily place the 4000 PM against the pole, attach it (chains and wing-nut tightener are permanently attached to tensioner), and start stringing in a matter of minutes. Conductor can be payed off any suitable reel stand. A collapsible reel attached to a winch shaft makes a practical puller, although any type of power previously used for pulling can be used.

TENSION WIRE STRINGING is the safe, economical modern way to string distribution and transmission lines. Why not get the facts? Write for new PENGO catalog TSE-1 for full data on the world's largest, most complete line of tension stringing equipment. Please address Dept. 124.

PETERSEN ENGINEERING CO., INC.
460 Kifer Road
Santa Clara, California
Phone: AXminster 6-7712

B-15

sion, succeeding **J. R. Connell** who resigned.

Kaiser Engineers has promoted **Franklin T. Matthias** to manager of heavy construction.

General Electric Co's Housewares and commercial equipment division has formed a new national distribution operation with **J. F. Stark** as its head, **D. S. Beldon Jr** in charge of national accounts, and **J. C. Hunt** supervising customer relations. **D. L. MacCuaig,** who headed distribution planning, became a consultant for International GE; his first assignment is to counsel with GE's Italian affiliate on management techniques and procedures. Meanwhile, **N. A. Langenfeld** was named manager marketing for portable appliances. **O. L. Shay** became manager-switchgear sales for the medium voltage switchgear department; **Clayton Ryder** was named manager of distribution sales for the semiconductor department; **Robert J. Guidera** became product sales engineer for the distribution transformer department's Hickory, N. C., plant; and **D. F. Carlisle** was named senior design engineer in the meter department's meter mounting equipment component.

At Kaiser Aluminum & Chemical Sales, Inc, **Neil K. Barr** has become technical manager, electrical conductor division, **John B. Roche** chief engineer for overhead conductor products, and **Roger S. Keith** chief engineer for insulated products.

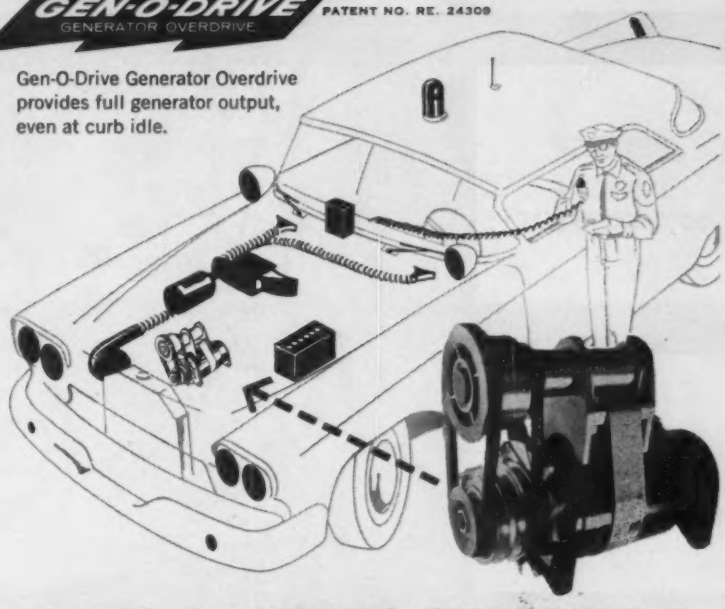
OBITUARIES

John P. Mailler, retired chief engineer for New Jersey Power & Light Co . . . **Homer W. Forschner,** general sales manager, Electric Machinery Mfg. Co . . . **Maurice F. Stack,** 77, former director and vice president of Ebasco International Corp, and Cuban Electric Co . . . **Laurens H. Cromwell,** 74, retired secretary-treasurer of Mississippi Power Co . . . **George N. Crosthwait,** 58, engineer for Texas Electric Service Co.

FULL ELECTRICAL POWER
at any engine speed!

GEN-O-DRIVE®
GENERATOR OVERDRIVE
PATENT NO. RE. 24309

Gen-O-Drive Generator Overdrive provides full generator output, even at curb idle.



KEEPS BATTERIES CHARGED!

End battery-generator breakdowns. New improved-model GEN-O-DRIVE offers efficient, dependable service. Assures maximum battery charge at any speed, *even with all accessories operating!*

Slow speed, long idling periods, sirens, warning lights . . . nothing can drain your battery. GEN-O-DRIVE gives top generator output. Prevents rundown batteries, cuts maintenance and costly replacement.

Economical! GEN-O-DRIVE needs no periodic service. Lubricated for life! No battery replacement . . . extends battery life. Full guarantee.

NOW! ***TWO SOURCES OF POWER FROM ONE GENERATOR!***

Watt Power®
AC-DC GENERATOR
Patent No. 2,939,975

WATT POWER
AC-DC GENERATORS
fit all F-L-M, D-R, Autolite systems. Provide normal DC and up to 1200 watts of 110-volt AC current!

RETURN COUPON FOR FULL DETAILS

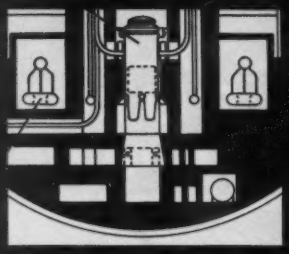
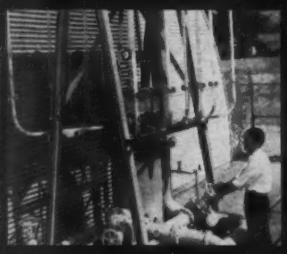
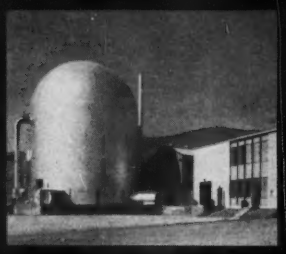
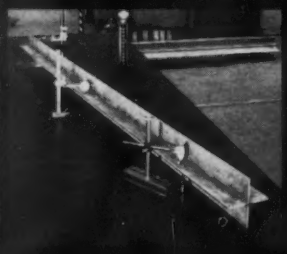
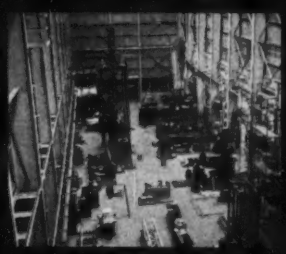
CONSOLIDATED GENERAL PRODUCTS, INC.
P. O. Box 7425C, Houston 8, Texas

Send complete information on: ☐ Gen-O-Drive ☐ Watt Power Generators

Name_____

Address_____

City_____ State_____

	DESIGN	DEVELOPMENT	MANUFACTURING
1956 CONSTRUCTION BEGINS	 300 ton pressure vessel design complete.	Heat transfer burnout loop constructed.	Test facilities constructed.
1957 DRESDEN 30% COMPLETE	 Two-phase flow loop piping studied.	 Tests begun at APED Vallecitos lab.	Pressure vessel fabricated.
1958 SYSTEMS TESTING UNDERWAY	 Cruciform control rod fabricated.	Dresden core mocked-up in critical facility.	300,000 fuel pellets fabricated a month.
1959 DRESDEN CRITICAL	Fuel sample system redesigned.	In-core instrumentation developed, built.	 Control drives designed, tested, built.

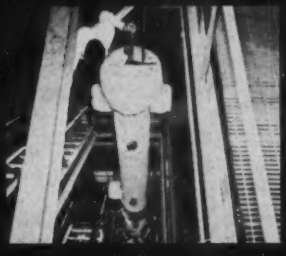
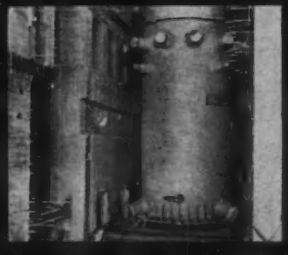
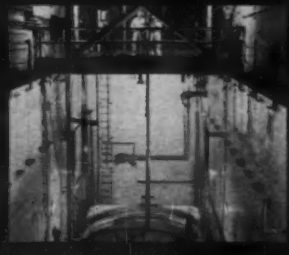
Dresden completed on time, on budget by General Electric project management

Utilities can now factor nuclear power stations into their system planning schedules, confident that they will be reliable power sources, constructed on schedule, and built for a firm price. General Electric's successful completion of the Dresden Station for Commonwealth Edison and the Nuclear Power Group*—on time, within budget—has proved this possible.

Major construction was completed within 13 days—criticality achieved within three days—of the scheduled target date set by G.E. 42 months earlier. Dresden reached rated power of 180,000 kilowatts net on June 29, 1960, following an extensive planned testing program. On October 12, Dresden was formally dedicated and is now serving as a reliable addition to Commonwealth Edison's system.

General Electric
Boiling Water Reactor Technology
Helps Lower Nuclear Power Costs

VALLECITOS BOILING WATER REACTOR

CONSTRUCTION	EQUIPMENT TEST	INSTALLATION	TESTING—LICENSING
Construction schedule set in 1956.			Atomic Energy Commission issues construction permit CPPR-2 after safeguards review of site and preliminary plant design. Certificate of Convenience and Necessity issued by State of Illinois for plant construction.
Tons of rock excavated for sphere.	 Instrumented drives scram tested.		Sanitary Water Board, State of Illinois, issues permit for sanitary sewerage system. Preliminary Hazards Summary Report submitted by Commonwealth Edison Company to Atomic Energy Commission.
Sphere segments welded before erection.	Sphere pressure tested to 37 lbs/in².	Instrumentation system installed.	U.S. Army Corps of Engineers issue permit for intake and outfall canals. Atomic Energy Commission issues license to store fuel at site. Certificate of Registration received from Illinois Department of Public Health.
Construction complete Oct. 13, 1959.	Turbine tested at site.	 300 ton pressure vessel erected.	 Dresden critical testing—Oct. 15, 1959.

A General Electric project management team coordinated the myriad complexities of building this first large-scale nuclear power station. Planning, development, design, construction, and scheduling of products and services from more than 1500 suppliers and sub-contractors, were directed and integrated by the project management team. Bechtel Corporation was the engineer-constructor.

For the detailed story of the Dresden Nuclear Power Station, write General Electric Co., Schenectady 5, N. Y. Request brochure GED-4275. For further information about General Electric's capabilities in the field of nuclear power generation or atomic products, contact your nearby G-E Sales Office or write to General Electric Company, Atomic Power Equipment Dept., San Jose, California.

132-07

** American Electric Power Service Corp., Central Illinois Light Co., Illinois Power Co., Kansas City Power and Light Co., Pacific Gas and Electric Co., Union Electric Company of Missouri, Bechtel Corp.*

Progress Is Our Most Important Product

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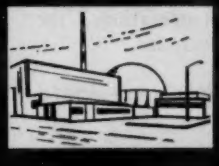
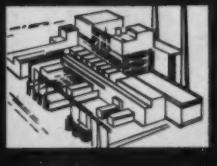
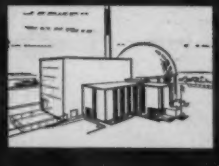


DRESDEN NUCLEAR POWER STATION

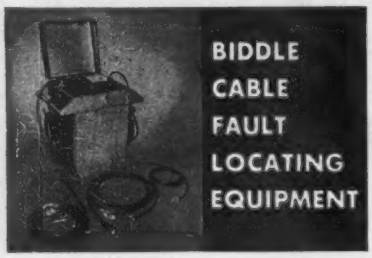


HUMBOLDT BAY NUCLEAR POWER STATION



BIG ROCK POINT POWER PLANT

...For Locating Faults in Lead-Covered Cable
...For D-C Proof Testing



Has applications on aerial, or buried cable, as well as on lead-covered cable installed in ducts. Equipment combines a high-voltage capacitor discharge transmitter with a detector to form a complete Tracer Current Set. Provides high current and voltage output with small energy input. Equipment is moderate in size, weight and cost. Use is not restricted by networks or branches, and under certain conditions will even operate successfully without disconnecting transformers. Method of detection indicates whether fault has been reached or passed when an exploring pick-up coil is applied at various points along the cable.

Biddle Models	Output Voltage	Discharge Capacitance
Catalog 651125	Up to 25 KV	1.65 muf
Catalog 651015	Up to 15 KV	2 muf
Catalog 651005	Up to 5 KV	16 muf

B-1005 **Write for Bulletin 65-W**

JAMES G. BIDDLE CO.
Electrical and Speed Measuring Equipment
1316 Arch Street, Philadelphia 7, Pa.

Reports on Atomic Wastes

EEI study tells problems, is optimistic on future

Radioactive Waste Handling in the Nuclear Power Industry. **Published by Edison Electric Institute, 750 Third Ave, New York 17, N. Y. 90 pages, illustrated. Price $2.00 to members, $5.00 to non-members.**

Radioactivity from nuclear reactors and spent fuels will be responsible for only a very small percent of the radiation doses for Americans in the next 30 years. Present reactor-waste disposal methods are satisfactory for spent nuclear-reactor fuels for several decades to come. Spent-fuel handling, processing and waste containment remains, however, a sizable expense and a potential source of hazard. Improved waste-handling methods and more economical containment are needed and are being worked on.

This picture is presented by *Radioactive Waste Handling in the Nuclear Power Industry*, a report published recently by EEI's Technical Appraisal Task Force on Nuclear Power. The 90-page report, prepared by Pickard-Warren-Lowe Associates of Washington, D. C., presents results gained from a wide variety of information sources, including owners and engineers of the six biggest nuclear plants now in operation or erection in this country and waste disposal hearings held last year by the Congress's Joint Committee on Atomic Energy.

"The production of radioactive wastes need not impede the development of large-scale and widespread nuclear power generation, provided waste handling receives intelligent and continuing attention and provided radiation protection standards remain substantially at currently recommended levels. In the long run properly controlled radioactive wastes may be no more of a technical problem than wastes from expanded use of fossil fuels."

Utilization of these wastes would help offset the waste-handling costs, which may run as high as $11 per gal total, or 33¢ annually, or as low as $3 per gal. But "there are no early prospects . . . that they [will] become an over-all credit rather than a liability."

More to the immediate and practical side are systems at nuclear plants for handling these wastes, solids, liquid and gaseous. The costs of on-site waste facilities vary, running up to 6.6% of total plant cost at Indian Point. The report goes into some detail on waste-handling systems and their components and describes the facilities at the six biggest US plants, with a schematic of each.

"Although the costs of properly handling radioactive wastes can be a very small fraction (1 to 5%) of total nuclear power costs, the consequences of mishandling them . . . could deter general acceptance of nuclear power generation. Therefore, waste handling deserves careful attention by power company executives and others concerned with nuclear power operations," the EEI task force concludes.

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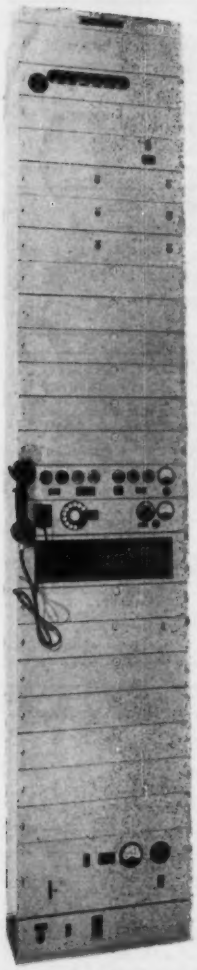
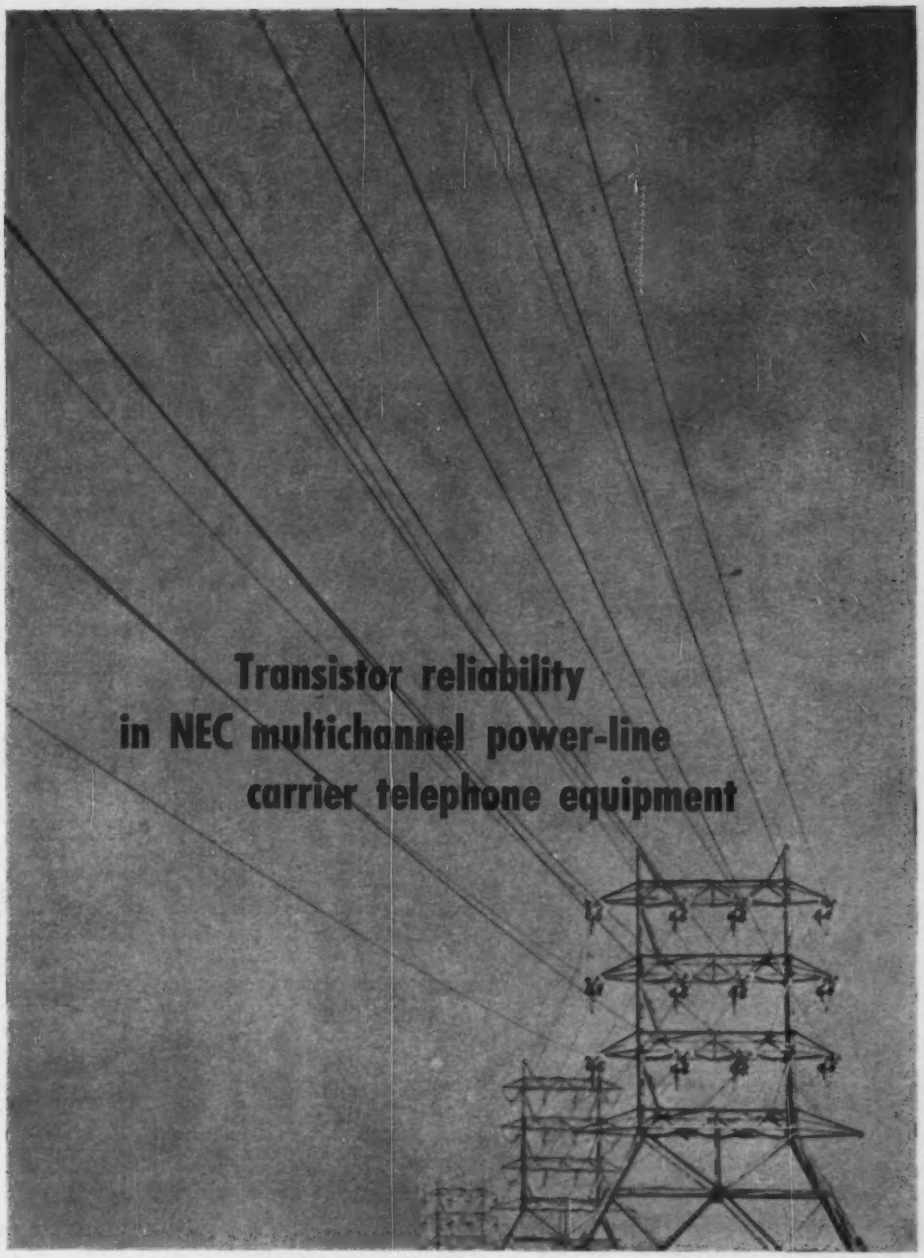


Single bay houses transmitter and receiver of 12-channel system.



Transistor reliability in NEC multichannel power-line carrier telephone equipment

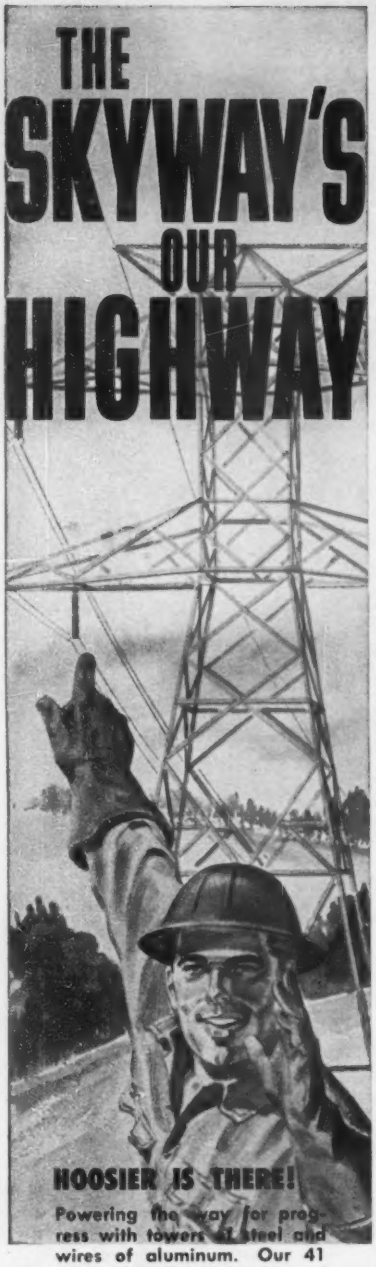
This transistorized power-line carrier telephone equipment offers power companies the lowest cost communications system available in capacities up to 12 channels.

Simple circuitry and absence of fading offer increased reliability over radio communications. No relay stations are necessary for long-haul communications up to 200 km. A carrier channel for protective relay system is incorporated.

Over 2000 terminal stations of NEC power-line carrier equipment have been installed. Power companies will be sent descriptive literature on request.

NEC *Nippon Electric Co., Ltd.* Tokyo, Japan

Communications Systems / Electronics



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HOOSIER
ENGINEERING CO.
1350 HOLLY AVE. • COLUMBUS 8, OHIO

Needed: Unit for Cycling

(*Continued from page* 61)

basis of kwhr/hr. A generating unit should be capable of continuous stable operation well below this percentage of its peak rating to allow for spinning reserve, a possible decline in system load factor, load variations within the hour, inability to dispatch units to exactly fit the load and flexibility in allocating generation for economic dispatch. In the past many units have been capable of satisfactory operation at 20% of rating and it appears that this would be a suitable criteria for a load cycling unit.

Variables In Design

If generating units are designed to carry a portion of all system loads, both base and peak, then a heat rate curve for a base load peaking unit should have a lower annual heat rate, as shown in Fig 3, than that shown for a comparable size unit designed primarily for base load. The improvement of the heat rate at some point below maximum output with a sacrifice of efficiency at full load may be accomplished in many ways.

Two examples of designs which produce a lower annual heat rate when evaluated on this basis provide for: **(1)** Bypassing high-pressure heaters, or **(2)** Bypassing the high pressure turbine. Heat rate curves for these are shown in Fig 4 and evaluated in Table 1. This is not an attempt to optimize on a design because there are various ways of altering the heat rate curve. This is only an example to show that both investment and annual fuel costs may be reduced by designing units to fit the load.

This broad approach to evaluating the performance of large turbines assumes that each unit when operating will carry a percentage of the system load proportional to its rating. This may not be the case for systems with large amounts of hydro power or for systems with large variations in fuel prices at different plants. It might also be altered by atomic power. However, it is suggested as a way of evaluating turbine performance. In many cases it will probably be as accurate as necessary and if the unit selected has all the other requirements it should be satisfactory for use until retirement.

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If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

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3—each—500 K.V.A.
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Representative wanted for manufacturer of street lighting equipment pole line specialties. Western States. Full particulars. RW-5056, Electrical World.

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Prefer applicants with working knowledge of Schematic and Wiring diagrams. Professional registrations recognized.

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EBASCO SERVICES INCORPORATED
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Geothermal Plant Starts Operating

Natural steam from wells drilled into volcanic formations near the earth's surface has begun operating turbines at America's first geothermal generating station. Pacific Gas & Electric Co's $2-million, 12.5-Mw commercial generating plant is located at the Geysers, Sonoma County, north of San Francisco.

Steam reaches the turbogenerator in the building at the right (photo) through a pipeline running down the slope from the steamwell area behind the hill in the background. The generated power is transmitted along a 10-mile, 60-kv line to tie in at Geyserville with PG&E's interconnected transmission system.

Automatic and unattended, the plant will be operated by remote control from Fulton Substation, 25 miles away, near Santa Rosa.

Work was begun on the plant last August after two years of planning by engineers of PG&E and the Thermal and Magma power companies, which developed the wells and sell the steam.

Mexico Development

(*Continued from page* 109)

this year and reservoirs are dangerously low.

Three of Mexico's major cities will benefit from the overall electrical output of the Balsas Basin—Mexico City, Guadalajara and Puebla. Other fast-growing cities that are secondary now but which will become big industrial centers such as Queretaro, Toluca and Quernavaca will also benefit. A lot of these places now have heavy thermal plant production and will continue to augment this. Mexico City, for example, is putting in its fourth unit at the Mexican Light & Power Co thermal plant. Puebla has two new thermal plants totalling 40,500 kw. But, in general, the Balsas Basin will be a vast hydroelectric network.

Transmission lines from Infiernillo and some of the other dams on the Balsas will be put in to link the system with the Miguel Aleman System near Mexico City.

Total cost for all the above planned projects will come to around $800 million, according to Cuauhtemoc Cardenas, but this is just an estimate. Exact figures can be given on the Infiernillo project. It will cost $72 million dollars. A French bank is financing the job with $28.5 million going into civil engineering work, $7.2 million into installation work and $36 million into equipment.

Advertising Index

Accoustica Associates, Inc. 88
Acme Wire Co. 113
Air Preheater Corp. 47
Allis-Chalmers Mfg. Co. 89, 91
American Concrete Corp. 111

Biddle Co., James G. 120
Blackburn Corp., Jasper 38, 39
Burndy Corp. 29

Chance Co., A. B. 6
Chapman Chemical Co. 116
Chart-Pak, Inc. 120
Chevrolet Div. General Motors 48
Consolidated General Products, Inc. ... 117

DeLaval Steam Turbine Co. 16, 17
Directory of Engineers 122
Dow Industrial Service
Div. Dow Chemical Co. 28

Engineers, Directory of 122
English Electric Co. Ltd. 115
Enjay Chemical Co.
Div. Humble Oil & Refining Co. 99

Fanner Mfg. Co. 112
Federal Pacific Electric Co. 96, 97
Fisher-Pierce Co. 14, 15
Foster Wheeler Corp. 30, 31
Foxboro Company 40

G&W Electric Specialty Co. 41
General Cable Corp. 44, 45
General Electric Co.
Apparatus Dept. ..... 2nd Cover
49, 50, 51, 81, 82, 83, 84
118, 119
Communications Products Dept. ... 36
Computer Dept. 10, 11
Graybar Electric Co., Inc. 7

Holophane Co., Inc. 100
Hoosier Engineering Co. 122

Indiana Steel & Wire Co., Inc. 98

Joslyn Mfg. & Supply Co. 92

Kearney Corp., James R. 32, 33
Kerite Company 52
Kerrigan Iron Works Co. 46
Kuhlman Electric Co. 13

Lapp Insulator Co., Inc. 4
Lennox Industries Inc. 86, 87
Line Material Industries 25, 26, 27

Moloney Electric Co. ..... 4th Cover
Monsanto Chemical Co. 37

National Exposition of Power & Mechanical Engineering 112
Nippon Electric Co., Ltd. 121

Ohio Brass Co. 8, 9

Petersen Engineering Co., Inc. 116
Pfaff & Kendall 90
Pitman Mfg. Co. 19, 20

RT&E Corp. 95
Reliable Electric Co. ..... 3rd Cover
Ripley Co., Inc. 94
Rome Cable Div. of Alcoa 18

Searchlight Section 123
Shaw-Perkins Mfg. Co. 114
Superior Switchboard & Devices Co. ... 114

Union Metal Mfg. Co. 12

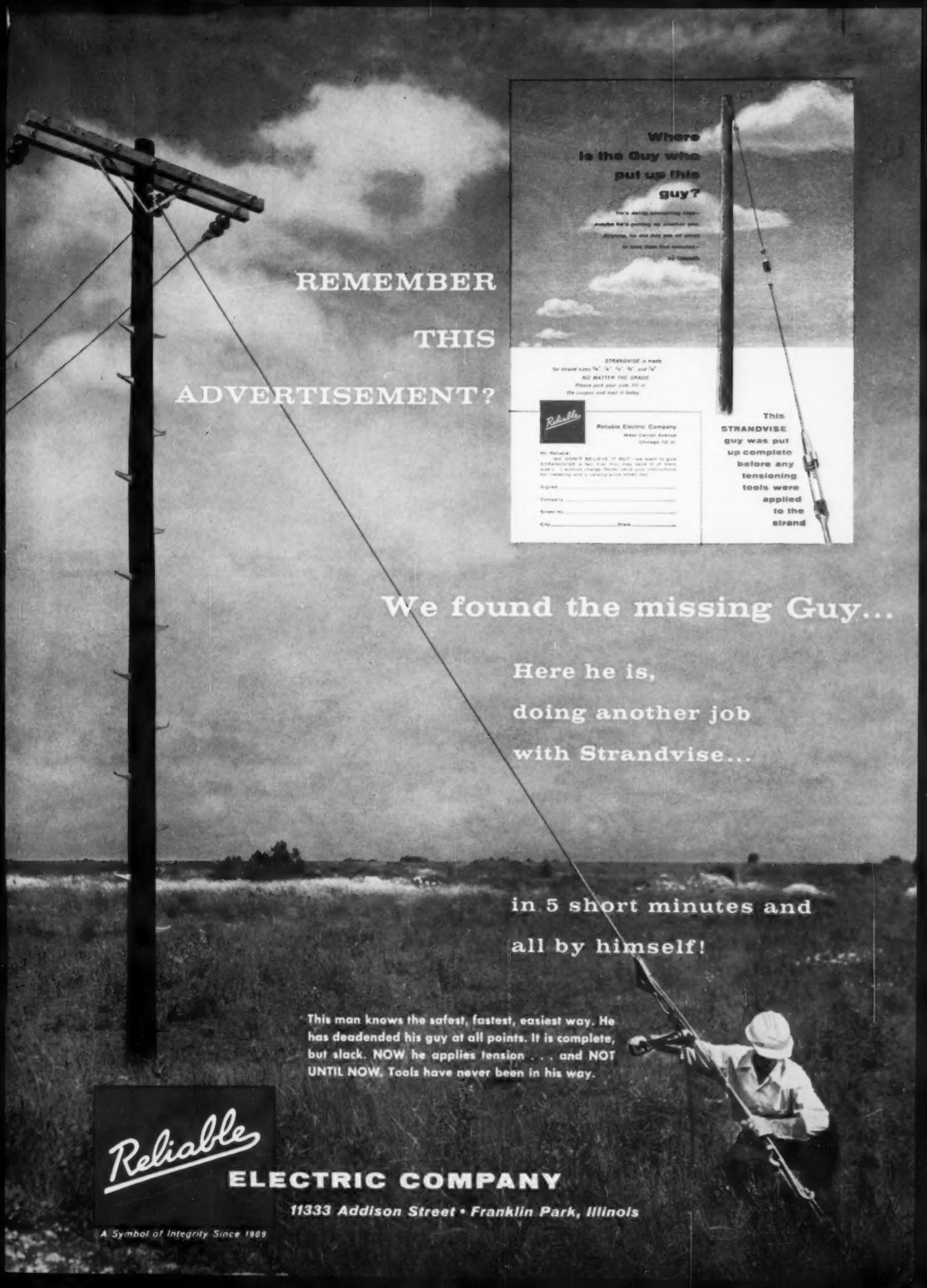
Wagner Electric Corp. 34, 35
Westinghouse Electric Corp. 42, 43
105, 106, 107, 108

PROFESSIONAL SERVICES 122

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 123

EQUIPMENT
(Used or Surplus New)
For Sale 123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